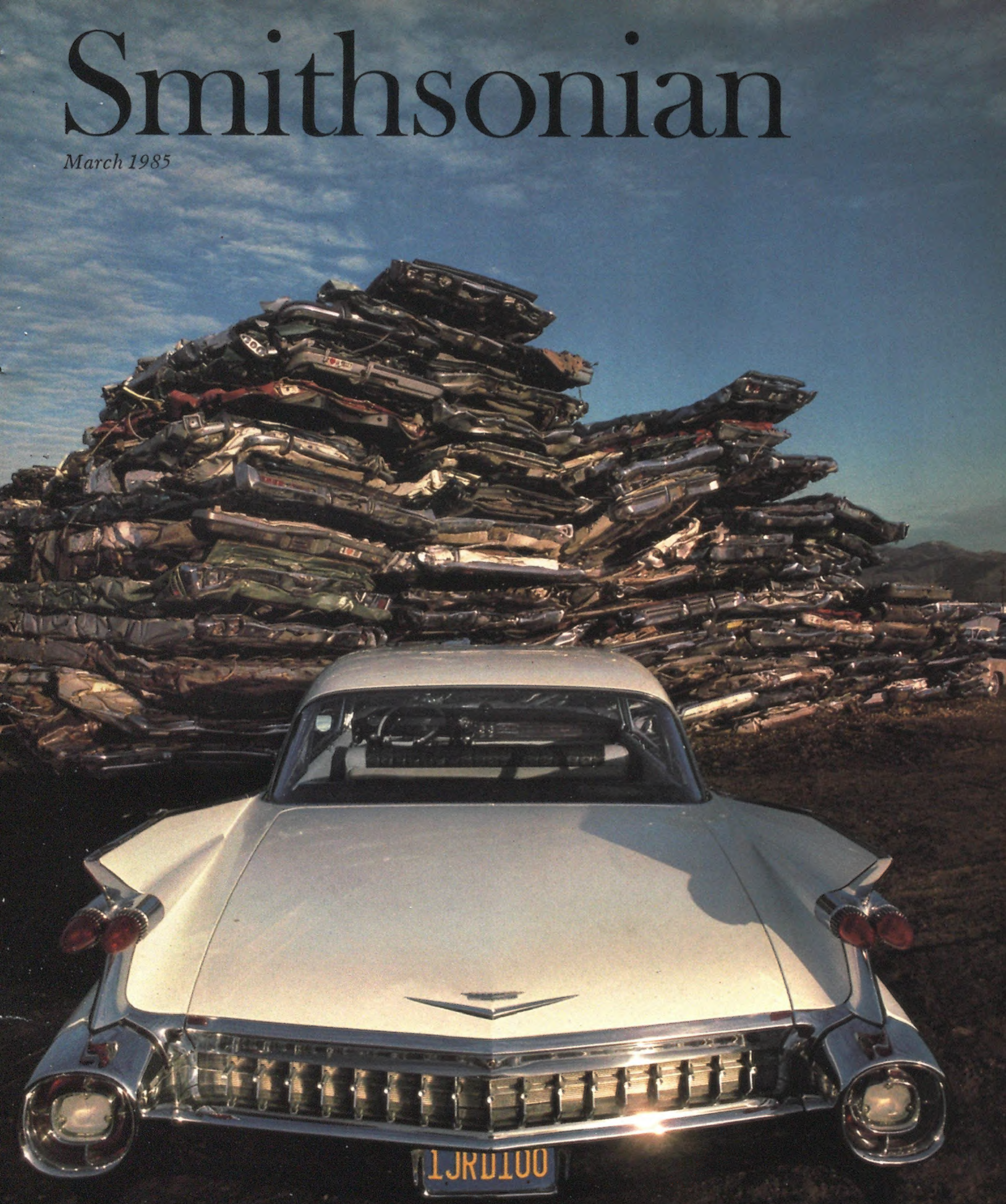
Smithsonian

March 1985



The joys of junk

Gleaming 1959 Cadillac was restored with parts found in California salvage yards (p. 52)

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March 1985

Smithsonian

Volume 15, Number 12

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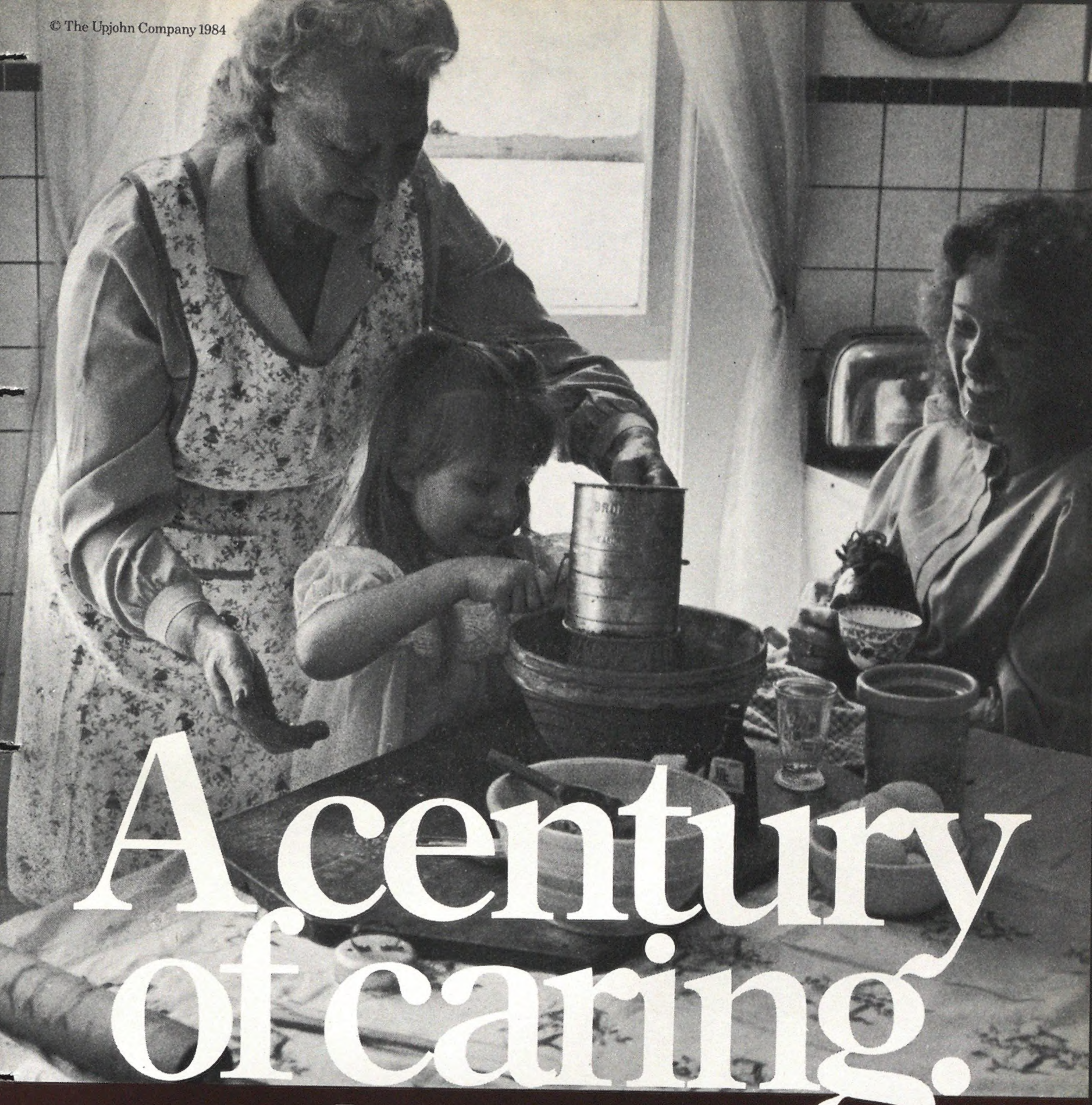

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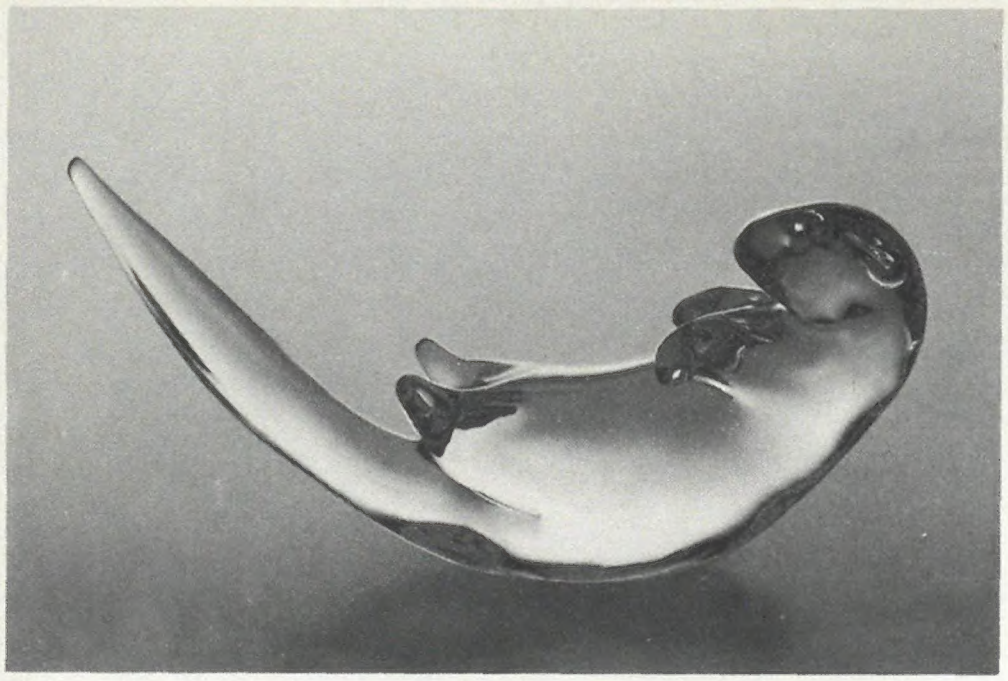

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CURB WEIGHT, lbs.	2920	2392	2885	2824	3045
WEIGHT DISTRIBUTION, front & rear, %	53/47	55/45	61/39	59/41	54/46
SEATING CAPACITY	5	5	5	5	5
FUEL CAPACITY, gals.	15.0	14.5	16.6	18.5	15.8
AERODYNAMIC DRAG, coefficient	0.33	0.38	N/A	0.42	N/A
1985 EPA FUEL ECONOMY** City/Highway, mpg	19/24	N/A	19/25	18/22	17/22
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Smithsonian horizons

The West assimilated 'primitive' art even as it was changing the cultures that had created it

Grand comparative themes are rare in this age of specialization. Dealing evocatively with one such theme is the newly published catalog of an exhibit at New York's Museum of Modern Art, *"Primitivism" in 20th Century Art*. It was edited by William Rubin, director of the museum's Department of Painting and Sculpture, who also wrote the Introduction. Its arguments and visually striking parallelisms are persuasive: the transformation that occurred at the creative forefront of modern art derives, to an unmeasurable but probably significant degree, from prototypes encountered along the peripheries of European expansionism.

The closeness of the connection should not be overdrawn. There is little to suggest that early 20th-century artists approached primitive art with the sympathetic understanding of an anthropologist, or even of a connoisseur. "You don't need the masterpiece to get the idea," Rubin was told by Picasso, who was indifferent to the geographic source—or even the authenticity—of the visually interesting images with which he surrounded himself. What counted for him, Rubin continues in this fine study, was the discovery of a shared quality of "conceptual modes of imaging" and the "substitution of reductive signs for direct illustration."

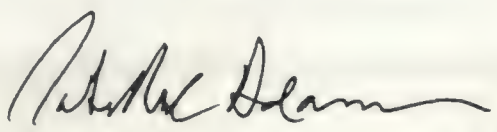
While there are problems for some of us in the notion of the "primitive" as a specific category, the relative isolation from one another of the traditions that Rubin brings together under this label is undeniable. Hence the direction of the influence on Picasso and his contemporaries is clear. The "emancipations from the restrictions of a perceptually based art" drew encouragement from cultures that then were being driven into subjugation, or even to the brink of destruction, by the same societies that were creatively assimilating their art.

Yet it is hard to avoid the impression that things were more complicated than this implies. Take the case of a craft that, at least at times, has verged on art. Arrayed along our mantelpiece are several fine examples of older Levantine craftsmanship in copper and brass. They were first acquired by the late John A. Wilson, a noted and beloved Egyptologist, in the years immediately following World War I. Such works were being produced in cities like Aleppo and Damascus a generation ago, but no longer. Plastics and imports quickly displaced the work of local metalsmiths for everyday use, with a spreading impact even where concern for traditional quality was still strongly asserted. Technical virtuosity and intricacy of design gradually gave way, for example, to looser, less heavily ornamental, more cursive patterns of uneven quality.

What relevance has a traditional Middle Eastern craft to primitive art? None, perhaps. Aleppo, many millennia old as a city, can already be found closely conjoined with the West by trade in Shakespeare's *Othello*. Hence we tend to think of changes in the state of its craftsmanship in contextual rather than purely stylistic terms: Do they reflect, for example, a worldwide loss of concern for ornamental detail, or for representational and symbolic fidelity? Is a loss of stylistic autonomy a natural accompaniment of increasing world interaction? What part do Western industrialization and dominance in trade, or the new mass media, play in the displacements of local arts and handicrafts? Is the process one of unequivocal deterioration, as local themes and standards are overwhelmed by the less discriminating eclecticism of tourists' demands for souvenirs? Or is change more complex, proceeding at once in different directions and on different levels?

An African example we are familiar with is perhaps more telling, both as unambiguous "art" and as "primitive." We have followed with interest the field of Makonde sculpture since the decade or so of my wife's working visits to Kenya and Tanzania, which began in the late 1960s. Trends are evident in these richly imaginative works in ebony that recall Middle Eastern metalwork, although admittedly our span of direct acquaintance with them was much shorter. Conceptually simpler, frequently grotesque forms were beginning to replace crowded, densely detailed, more massive groupings of recognizably human figures.

We have lived with these particular examples, so perhaps I overgeneralize from them. But I think not, for they lend shape to a host of more fragmentary impressions. If I am right, a mode of seeing which in our tradition had to be "emancipated" from representational and other stylistic constraints may have ebbed and flowed in the world of the "primitive" rather than residing there pristine and changeless. Its flowering in large parts of that world on the eve of revolutionary changes in modern Western art then might have something to do with cataclysmic social changes for which the West was itself largely responsible. And the framework of explanation, becoming more extended in geographic scope and depth of time, also reaches beyond the autonomous realm of Art and Style to embrace the interacting societies and cultures in which both are embedded.



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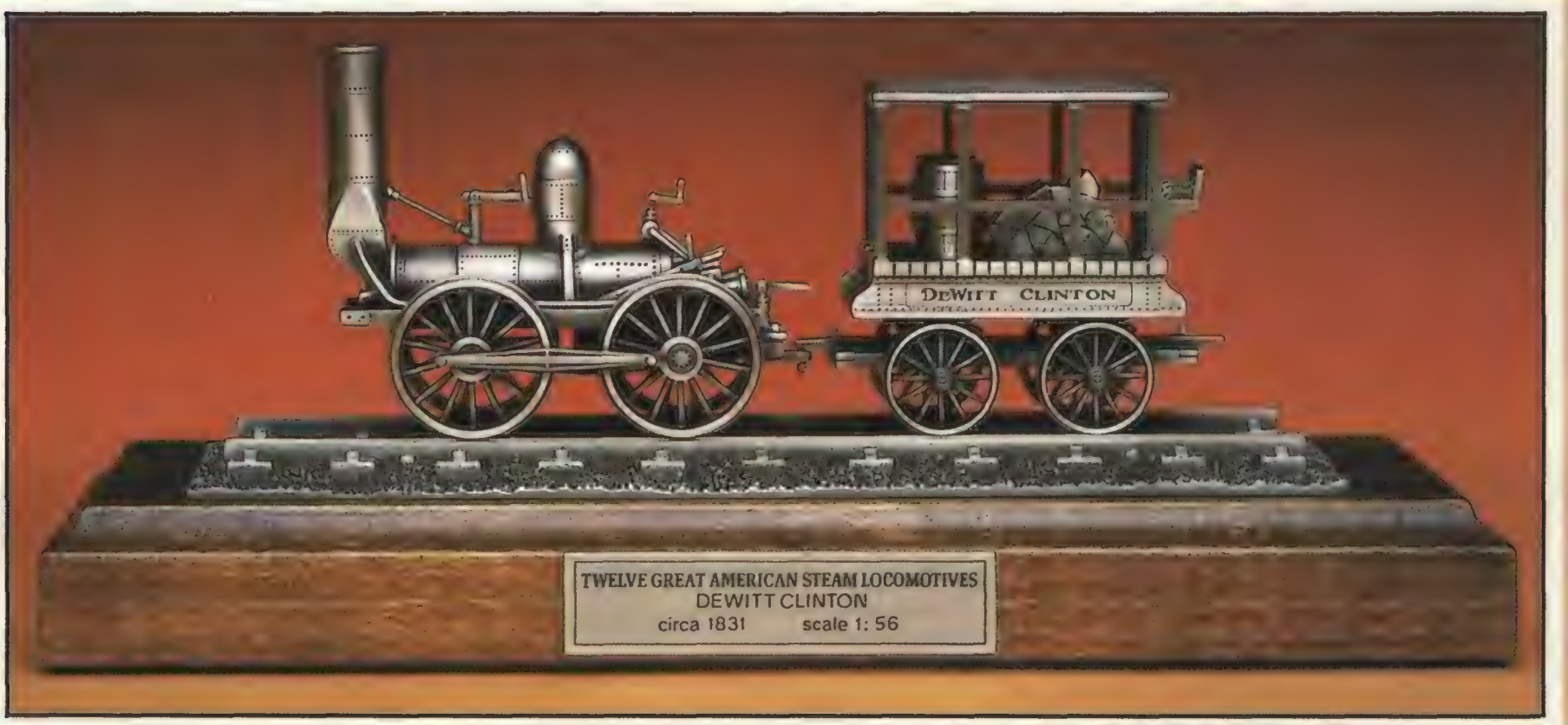

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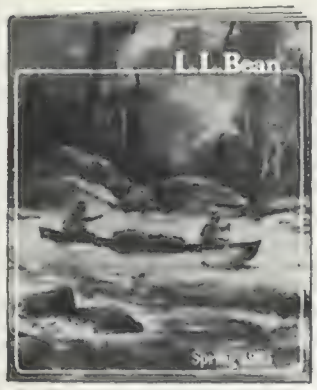

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Letters to the Editor

Pearls

Dear Sir: Your January cover story by Nigel Sitwell may be rendered complete by one additional important reference. Matthew 13: 45-46: "Again, the kingdom of heaven is like unto a merchant man, seeking goodly pearls: Who, when he had found one pearl of great price, went and sold all that he had, and bought it."
Richard Hahn
Erie, Pennsylvania

Dear Sir: What an appalling contrast—the opening photograph in your article, a natural, simply elegant pearl held between fingers with gaudy, artificial, red-lacquered claws.
Jill Hoover
Iowa City

Prince Eugene of Savoy

Dear Sir: I object to your consistent romanticizing of war and warriors. You make the expansion of Austria and Louis XIV's dreams of universal empire sound innocent. To me, they are as innocent as Hitler's advances and the Russian invasion of Afghanistan. The 30,000 Turks killed at Zenta were children of God, however misled. It is in poor taste to represent this slaughter as being conducted with skill and charismatic leadership.

The current world military situation is a continuation of attitudes and fears going back long before Eugene. Military solutions now pose the threat of universal destruction, and we cannot see war for anything but what it really is: a crime against God and humanity.
Steve Reynolds
Middlebury, Vermont

Dear Sir: Credit goes to the *Bismarck* rather than the *Prinz Eugen* for the destruction of HMS *Hood*.

In May 1941 both the German battleship *Bismarck* and the *Prinz Eugen* were engaged against HMS *Hood*. The fifth salvo fired by the *Bismarck*'s radar-sighted guns struck the *Hood*'s aft 15-inch magazine, sinking the ship in seconds with a loss of 1,418 officers and men. There were only three survivors.
Randall A. Friedrich
Bearden, Arizona
Mr. Friedrich is correct. Ed.

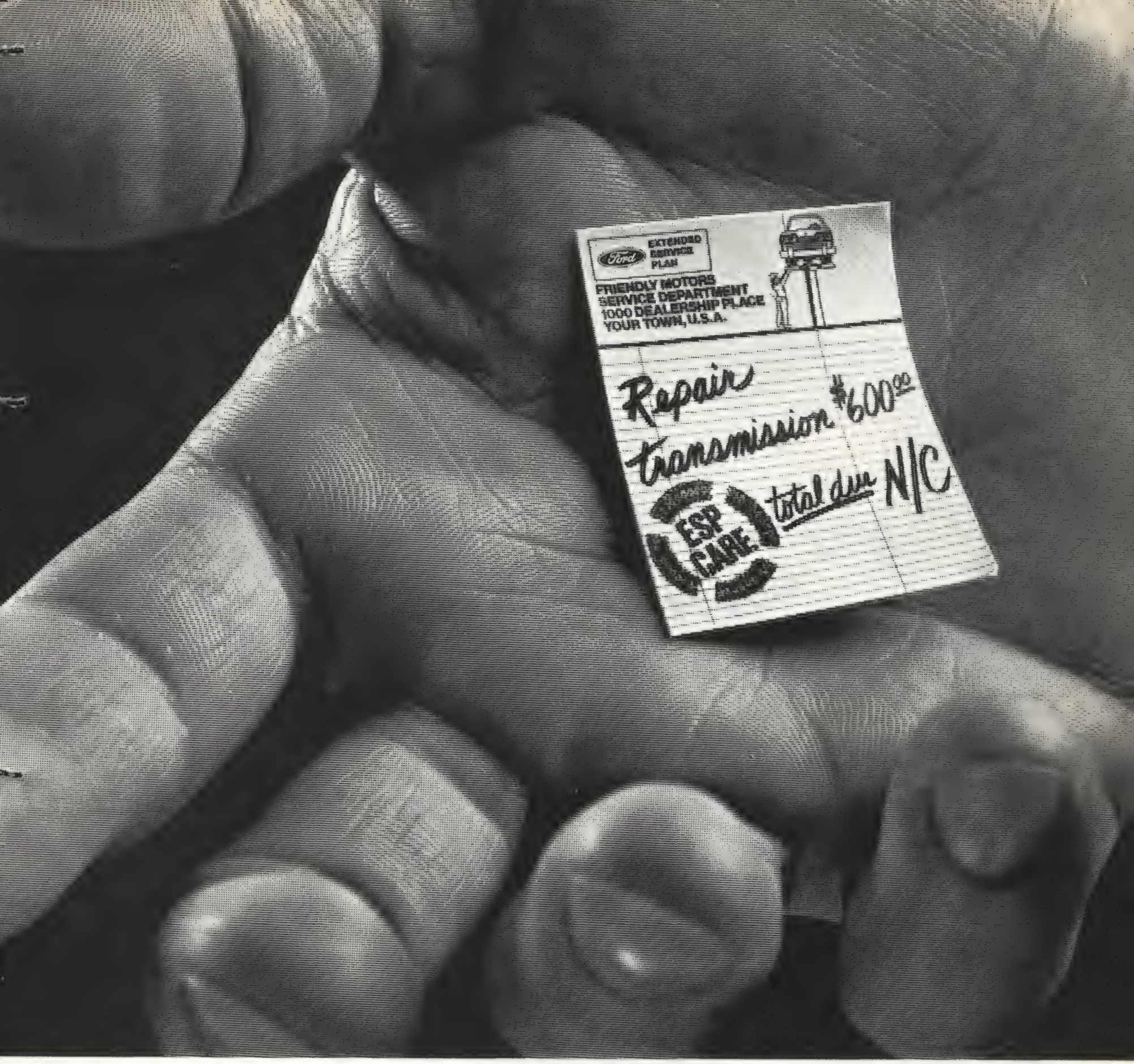
Dear Sir: Prince Eugene was the ideal representative of European culture, but his brilliant career was not an endless succession of victories. Let's be fair to Marshal de Villars, who defeated him at Denain in 1712. "Denain saved France," Napoleon said. This French victory put an end to the War of the Spanish Succession.

Eugene's mother, Olympe Mancini, Comtesse de Soissons, did have an affair with Louis XIV, but his first passion was for Olympe's younger sister, the alluring Marie. The young king had picked her from the bevy of "Mazarinettes," and Queen Christina of Sweden encouraged her royal cousin to marry for love. So Louis defied his mother, Anne of Austria, and the powerful Cardinal, but finally had to give in, for reasons of state, and marry the Infanta, Marie-Thérèse.
Monique M. Byer
Springfield, Virginia

Dear Sir: Mr. Wernick left out the real hero in the siege of Vienna.

King John III Sobieski of Poland, acting on pleas from Austrian Emperor Leopold I and emissaries of Pope Innocent XI, hastened to Vienna with some 25,000 Polish troops. They were joined by Austrians, Germans and Lithuanians. On September 12, 1683, in one of the decisive battles in military history, the heavily outnumbered Sobieski and his troops routed the Muslim forces and saved Christianity and European civilization.

After the battle nearly all European monarchs sent letters of congratulation and expressions of admiration to the Polish king. Sobieski sent a terse message to the Pope: *Veni, Vidi, Deus Vicit* (I came, I saw, God conquered). The Pope wrote him: "Your illustrious name will assuredly be recorded in the annals of the Catholic Church."



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On September 10, 1983, in Vienna's Heldenplatz, Pope John Paul II echoed Pope Innocent's message of 300 years ago.
Joseph Alecks
Boston

Dear Sir: When we lived in Vienna on the edge of the Turkenschanzpark (Turkish Redoubt Park), we heard the story that when King John Sobieski swept away the besieging Turks, among his captured booty was all the Turks' coffee which, as everyone knows, became a staple of Viennese life.
Margaret Mapother
Potomac, Maryland

Global jigsaw puzzle

Dear Sir: Walter Sullivan's enlightening article revived memories of the first time I heard of the theory of plate tectonics. It was 60 years ago and I was a fifth-grader.

Kenny, a ten-year-old classmate, tore from his geography book a map of the world, cut out the various continents and demonstrated for class and teacher how the pieces fit together: the eastern bulge of South America into West Africa, and so on. "They must've moved around."

"Kenneth," our elderly spinster teacher remonstrated, "that is the most ridiculous thing I ever heard of."

Whereupon, just as Galileo courageously told his inquisitor that the Earth *did* move, the boy said defiantly: "But everything fits just perfect, Teacher."

"The word is 'perfectly,' Kenneth, not 'perfect,' and your parents will have to pay for that geography you damaged."

Vive le Kenny!
Tom E. Clarke
Seattle

Wolves

Dear Sir: David Nevin made no mention of the important role of the wolf and other predators in maintaining the health of prey species. The predators' taking of sick and weak animals is well documented.
Cyrus F. Wood
Estes Park, Colorado

Dear Sir: I take exception to the implication that wolves will not attack and kill people. They will when in a pack. My great-grandfather homesteaded in Iowa before it was admitted to the Union. His nearest neighbor, seven miles away, left

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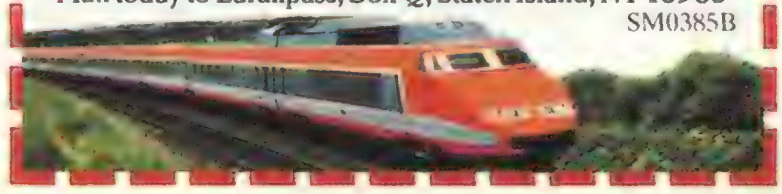

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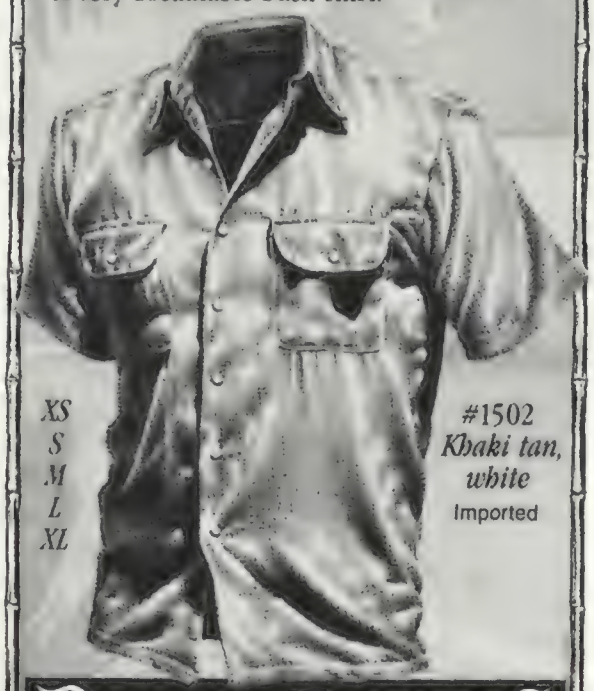

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for home after visiting at his place. As the friend neared home, a pack of wolves attacked. He grabbed a rail from his fence and killed five before they got him.
D. G. Harrington
Pierre, South Dakota

Dear Sir: John Faulkner's comment that people should go to Alaska if they want to see wolves reveals a small-mindedness that does not even begin to understand the physical and spiritual reasons people long to ensure that the wolf and its habitat live on. Just knowing that the great wolf exists out there in the wild in some of its old stomping grounds helps me get in my truck every morning and drive to the air-polluted, factory-clogged city and Man's artificial world.

The American taxpayer has subsidized the rancher with almost free public grazing, and has paid for poisoning of the coyote because greedy folks cry that they can't make money without killing these other beings. Such people receive cheap electricity and irrigation because of huge federal water projects paid for by the American taxpayer. Yet when there is a need to reestablish the wolf in selected areas these selfish people are apt to drive around with bumper stickers that read: "America, Love It Or Leave It." They could be the ones who will decide if *you* are deserving of staying.
Ted Plottner
Meeker, Oklahoma

Dear Sir: As a confirmed friend of the wolf, I was horrified by the continuing proposals to hunt this magnificent animal for "sport." Frankly, I think a preserve should be set aside for all sport hunters—where they could hunt each other.
Lori L. Chapek-Carleton
Lansing, Michigan

Greatest aerial warfare photos

Dear Sir: For years Reed Chambers' 32 Archer prints adorned the inner wall of his private office in lower Manhattan at the aircraft insurance firm he founded in 1928. I saw and marveled at them, never thinking they would be proved false when, in 1968, I was writing an aviation magazine column about Chambers.

His office was something of a museum, recalling what had been a high point of his life: active duty in France in 1918 with the famous U.S. Army Air Service

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94th "Hat-in-the-Ring" Pursuit Squadron. There were superbly detailed scale models of the Spad and Nieuport scout biplanes he flew under the command of Captain Eddie Rickenbacker and, cut from the fuselage and framed, the hat-in-the-ring insignia which had adorned his Spad 17 fighter.

That Chambers held to his belief in the authenticity of Archer's photos until the last was consistent with his nostalgic memories of combat in the skies above northeastern France.

Robert Young jr.
Sacramento, California

Dear Sir: When I read Edwards Park's story I felt satisfied that my instinct was right some years ago. Leafing through war history books, I had seen the picture on your pages 102-03 and had thought it was faked. I speak from an interest in aerial tactics—my father was a career Air Force officer who flew in World War II—and as a commercial photographer who knows how to alter photographs.

However, I figured someone knowledgeable had to have examined this dogfight photo and declared it authentic enough to appear and reappear in history books despite its blatantly fake look: a shallow depth of field and a high shutter speed good enough to freeze the motion of the planes so as to show great detail yet not to stop the propellers!

Mike Whye
Rock Rapids, Iowa

Outdoorsy duds

Dear Sir: As a person who goes outdoors as little as possible, I feel in a good position to give L. L. Bean an enthusiastic endorsement. While reading Wolkomir's words, I was wearing L. L. Bean pants, sweater, socks and slippers.

Deborah Wills
Fargo, North Dakota

Human-powered vehicles

Dear Sir: Aside from the stimulus of the prizes, the primary reason for the original development of Dr. Paul MacCready's *Bionic Bat*, with its carbon spar, cantilever wing and weight of only 72.5 pounds, was that it would serve as a stepping stone toward development of some long-duration, highly efficient drones. Such remotely piloted drones, flying for

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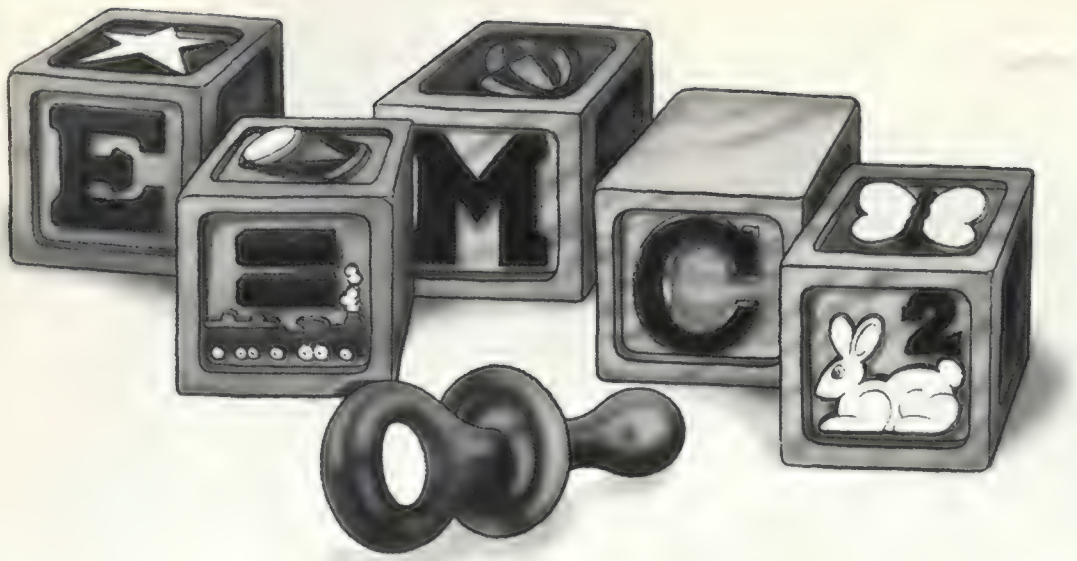

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Simi Valley, California

Butterfly jungle

Dear Sir: At age 12, near Calgary, Alberta, I discovered huge green larvae that no one could identify. I reared them to adults, but it was 20 years before I learned their scientific names. I've been rearing lepidoptera on a small scale ever since.

Let's hope we soon get several American butterfly houses. In 1955 I was hired by the late lepidopterist Robert G. Wind to be caretaker of a butterfly house he planned for Pacific Grove, California. It was to be along the lines of Clive Farrell's. But financing fell through, and with it the project. How exciting to find that someone else has completed one. The educational possibilities are tremendous.

During 30 years of teaching I've introduced butterflies and moths to thousands of children, with live ova, larvae, chrysalides, cocoons and adult moths all in the classroom at the same time.

Paul W. Beard
Mariposa, California

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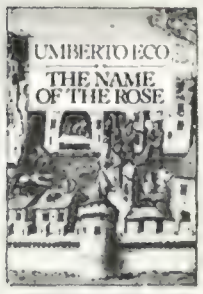

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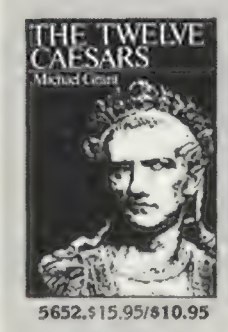

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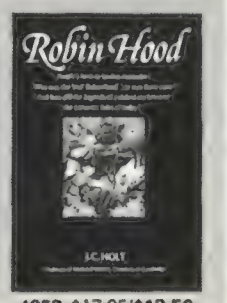

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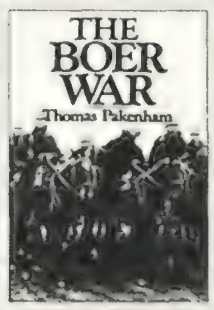

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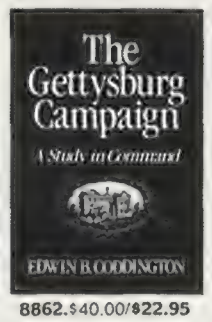

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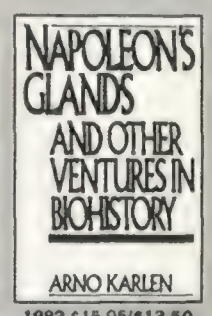

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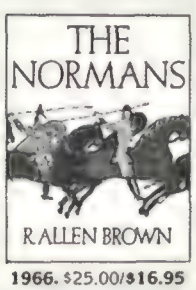

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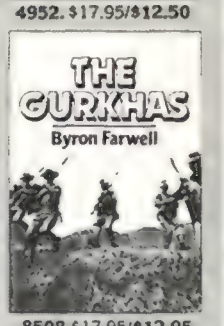

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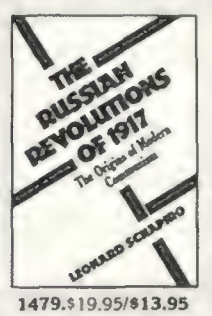

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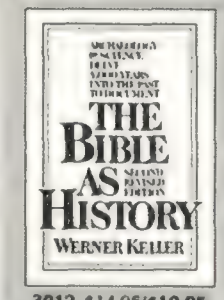

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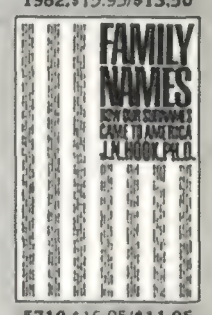

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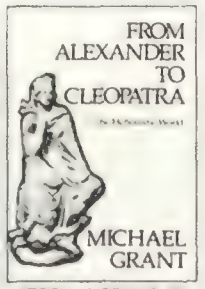

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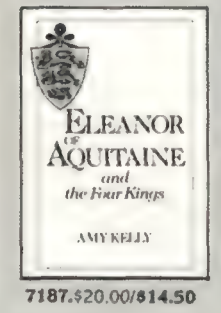

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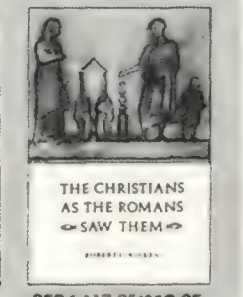

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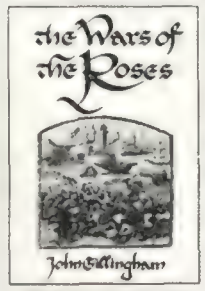

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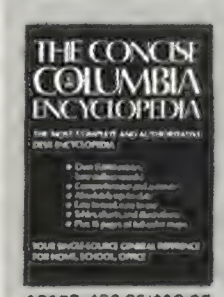

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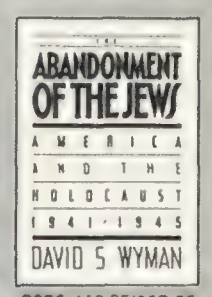

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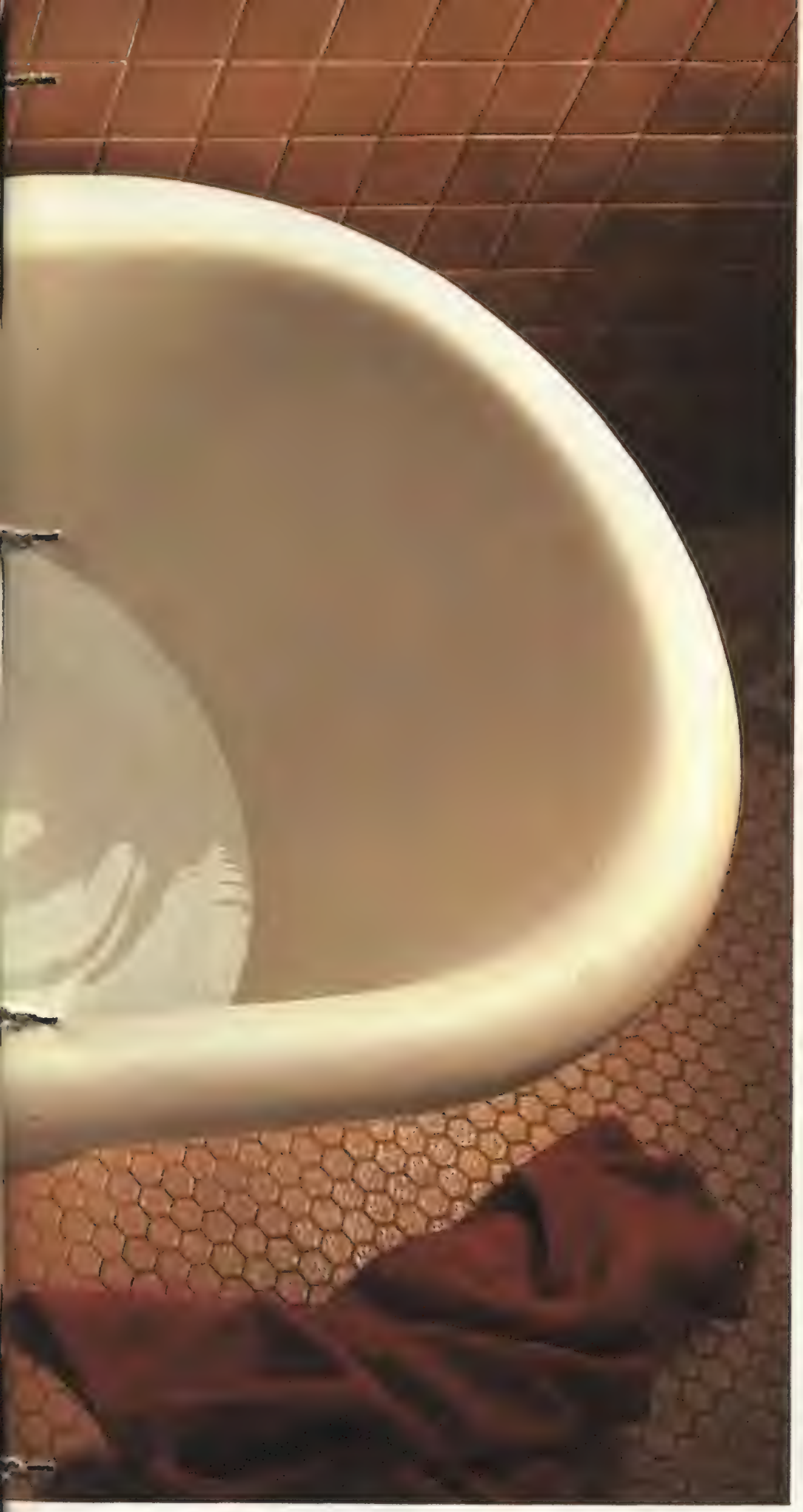

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Around the Mall and beyond

This month marks the diamond jubilee of a great old Smithsonian landmark, the Natural History Building. It opened without ceremony on St. Patrick's Day, 1910. The building was not yet completed, and since the Mall entrance wasn't ready, guests entered from B Street, today's Constitution Avenue. To reach the doors they passed the nearby Washington Central Market, where drays rumbled and teamsters were wont to fill the air with picturesque language. Inside, visitors received catalogs and went upstairs to look at the art collection in what is now the Dynamics of Evolution Hall.

As is always the case when the Smithsonian gives birth to a new building, this one was received by the staff with joy and relief. Space is a glorious and short-lived luxury at the Institution. Providing a fresh supply of it is like shipping truffles to a French chef. Joseph Henry, the Smithsonian's first Secretary, never wanted the Institution to be diverted from the mainstream of research into what he considered the backwater of collection and display, which he viewed as "a perversion of the [Smithson] trust." Let the "National Cabinet of Curiosities," the objects so far gathered by the young United States, remain in the Patent Office, to which they had been consigned.

The trouble was that this collection kept growing, and the Patent Office had other things to do besides supervise it. In 1858, after considerable finagling with Congress, Dr. Henry found himself its unwilling keeper. Fortunately he had agreed to accept the collection only if the government picked up the bill for maintenance and display.

Paintings, sculptures, American Indian material, specimens from the U.S. Exploring Expedition of 1838-1842, led by Lt. Charles Wilkes, had been crammed into every conceivable corner of the castle.

May 11, 1909: the last granite block is lifted into place atop the south porch—Mall entrance—of the Natural History Building.

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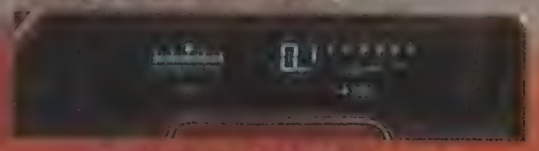

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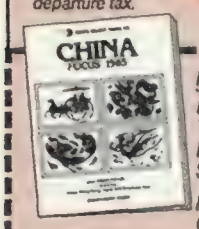

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They soon outgrew the allotted space.

In 1881, the new U.S. National Museum opened next door to the castle, and the burgeoning collections, much fattened by the Philadelphia Centennial Exposition of 1876, moved into new quarters. Very soon it was as overpopulated with items as the castle. The Smithsonian begged for another building, and after 20 years of pleading, Congress appropriated $3.5 million. On June 14, 1904, Secretary Samuel Pierpont Langley, still subdued by the failure of his giant Aerodrome to become the world's first man-carrying, heavier-than-air flying machine, broke ground for the Natural History Building.

By the time the great structure opened, exactly 75 years ago, it seemed certain to answer all curatorial prayers for enough space at last. It took up nearly four acres of land; its great rotunda, still unfinished, would rise 125 feet to that inner dome which I conquered back in my salad days, three years ago, and wrote about in March 1982. From it, wings reached out along the Mall, each about a block long; and another, slightly shorter, stretched north to B Street. Supplementary halls, or "ranges," squared off the wings and formed two open courts. These helped get enough light and air into the huge museum. The rotunda had four stories; the wings, three—the first two for display, the top for offices. Surely almost 11 acres of floor space would do the trick.

How innocent we were to have such smug assurance. The items that the staff carried over to the new building in 1909 —first came paintings and sculptures belonging to the National Gallery of Art, as it was then called—were set up as displays and put in storage areas, and seemed at first to fit the building. But things kept coming. Ex-President Theodore Roosevelt, who had left on an African safari a year before the building opened, soon smothered it with more than 15,000 specimens (some are still on display). Before long, the two or three million objects had grown to 50 million. By the time the "new National Museum," as it was long called, was 20 years old, new wings for additional space were authorized by Congress. However, they weren't built until the 1960s.

These new wings were used for new office and research space, but storage still filled corridors and odd corners as well as open areas. I well remember trying to

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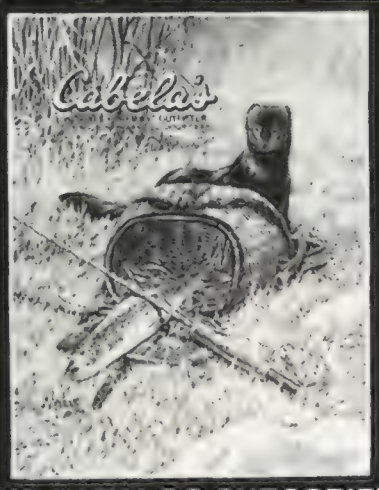

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keep appointments with scientists and being baffled and delayed in reaching them because virtually all access was filled with cabinets, each filled with drawers, each of *them* filled with bone fragments or bird wings or beetles. Finding an office was like penetrating a maze. Paths between ceiling-high cabinets suddenly made right-angled turns or came to inexplicable dead ends.

These were in the *new* wings, mind you. Out on the upper floors of the rotunda were endless shelves of more specimens. Open a drawer at random and you might face a series of grinning human skulls. And if you ventured into purely utilitarian spaces, supposedly sacred to heating pipes and air-conditioning ducts, you might well find them crammed with stuffed animals. About 62 million items were finally tamped into the Natural History Building before relief came.

It came with the new Museum Support Center in Suitland, Maryland. This great complex (see this column for May 1983), offering 15 acres of storage space, will certainly ease pressure. But the number of objects collected for natural history study and display continues to mount.

The Natural History Building, according to its knowledgeable chronicler, Ellis Yochelson, a geologist with the U.S. Geological Survey and research associate in the Department of Paleobiology, was an instant hit with the public—the first Smithsonian museum to open on Sundays. It also played an important part in the maintenance of the other two Smithsonian buildings—the castle and what was becoming known as the Arts and Industries Building. Heat and hot water from Natural History's coal furnaces reached those two through tunnels under the Mall. So did electricity from Natural History's generators. An ice plant remained in service until after World War II.

During two wars the building and its staff did their bit. Insurance clerks jammed the great halls in 1918, and after the Armistice, when visitors returned to the building, they found a "War Collection" sharing space with natural history objects and works of art. In World War II many items were moved away for safekeeping, and war-connected projects were carried on in the building.

A new era has come to what is now one of Washington's classic buildings. Breathing room is beginning to be restored. The art has gone to what is now the National

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Museum of American Art at the Old Patent Office Building. I guess the only painting left is my old friend *Diana of the Tides*, which was uncovered when the new Dinosaur Hall was being shaped up. Poor, half-clad Diana has now been sealed up again behind a wall of plaster.

B Street is now Constitution Avenue, the market has moved away and so has the stuffed bison that first grazed in the rotunda of the new museum. Now the enormous African elephant greets six million people a year—second only in visitors to the National Air and Space Museum.

The visitors don't know about the ghosts. The building may be a mere three-quarters of a century old, but among the staff people who first moved into it were some of the old Smithsonian's most revered—and eccentric—scientists and researchers. John Sherwood, that splendid historian of the Smithsonian, recalls the Norwegian, Leonhard Stejneger, with his white Vandyke beard and his black cape, clicking his heels together while he danced the mazurka.

What was Stejneger's discipline? Hard to say. Ornithology, herpetology, zoology, entomology and botany could all claim him as an authority. His mother had wanted him to be a doctor, so he studied medicine, then ventured off through the doors it opened into the whole realm of biology. He was a fine artist, a classicist, spoke several languages and somewhere along the line picked up a law degree. He kept working until he died at 92. One day, during those last years, a car knocked him down. Says Sherwood, "He simply got up, brushed himself off, and apologized to the driver for getting in his way."

Stejneger was an inspiration for marine biologist Waldo Schmitt, who joined the Institution as a temporary assistant, hired because Mary Jane Rathbun, a researcher and authority on crabs, thought so much of his work that she resigned her position and gave up her tiny salary to take him on. Mary Jane, the "Crab Lady," continued her own work as an honorary research associate—no pay—and Waldo, the "Shrimp Man," remained with the museum for 67 years. At age 76, "Uncle Waldo" brought 30,000 specimens back from yet another trip to Antarctica. Schmitt Mesa, down there, is named for him.

The physical anthropologist, Aleš Hrdlička, collected most of those skulls I saw—and thousands more. Sherwood says Hrdlička thought burying completely irresponsible and a waste of valuable scientific material. Born in Bohemia, Hrdlička, like Stejneger, was a classicist and linguist. He, too, studied medicine, then drifted off to hunt bones. He wore old-fashioned clothes, thought women had no place in science and despaired of their smoking and wearing makeup. Few visitors could escape his office without having their skulls measured.

There were many more. The entomologists Frank Chittenden and Eugene Schwartz enraged each other by stealing each other's specimens. The lepidopterist William Schaus kept an English valet who went on field trips with him and ended up richer than his employer. There was a male bigamist and a lady who was interested in nothing but grasses, and another lady who lived in her lab and startled guards at night by emerging in her dressing gown with a chamber pot.

Most of the people around the museum today are a little less eccentric, but I guess that's all right. Happy diamond jubilee to them all.

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Phenomena, comment and notes

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The space in question is that on the roofs of our large buildings. Those acres and acres of tar and plastic are broken only by outcroppings of elevator shafts, vent pipes and air-conditioning machinery. And yet they could be the substrate for green, growing things, the foundations for gardens in the sky. The idea is not new. People have been growing plants on their roofs at least since the time of Babylon. But the practice is not widespread. It is the exception rather than the rule, more associated with the penthouses of the wealthy than the workaday world of office and factory. And yet putting a garden on the roof is good for a building. As we shall see, it helps eliminate the flaw shared by nearly all large buildings (no matter how carefully they were constructed): a roof that leaks. It also turns wasted space into valuable real estate.

Such gardens are good not only for the individual buildings they sit on, but improve the quality of life all around them. They are good for people and, even in the middle of the largest city, good for wildlife. Planted roofs create refuges for people—office and factory workers on their

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lunch hour, apartment dwellers any time. They can be safer for children than parks on the ground—no streets to cross, less access for undesirables. And they can be refuges for animals. Migrating birds gain a place to rest and feed, and certain endangered species could be protected there. What safer place for an endangered turtle, proponents argue, than a pond ten stories above a city street, where no predators could reach it?

Roofs are the single most intractable problem in large buildings; no matter what you do, they leak. Conventional roofs, built up of layers of tar and felt, eventually leak, so the owners put on more layers until finally they have to scrape them all off and start again. Newer technology uses plastic membranes that do better than tar, but in time they, too, will leak.

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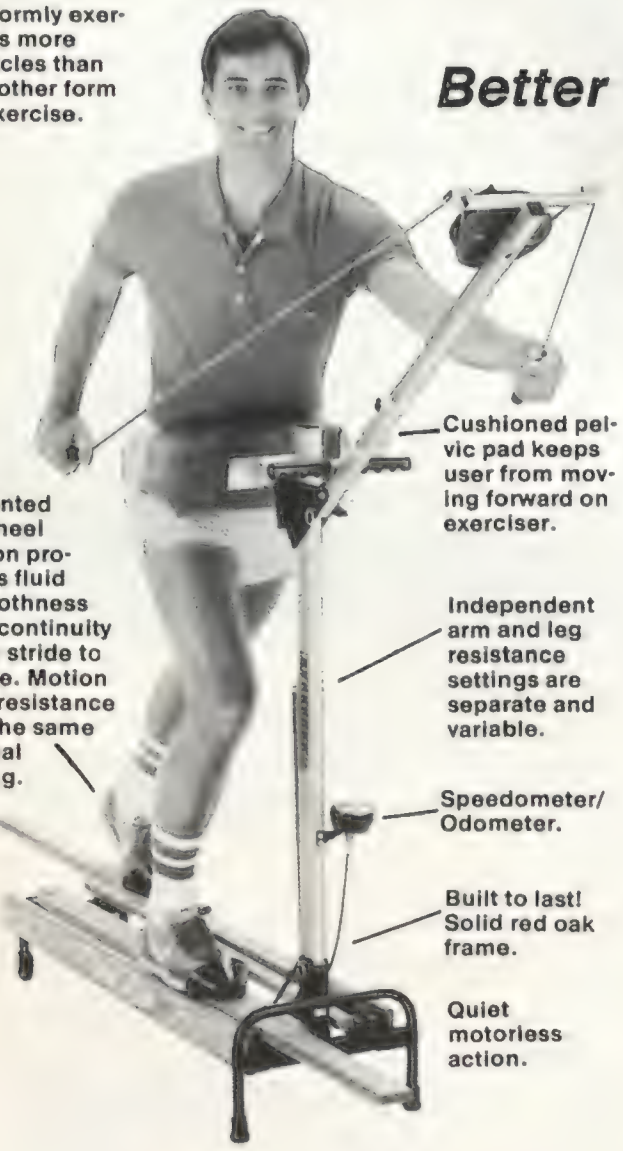
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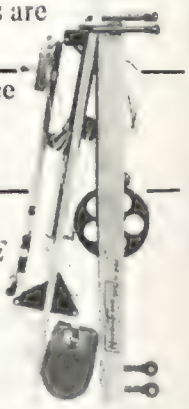

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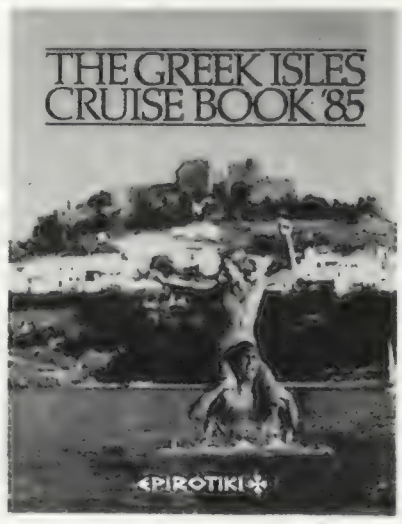

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Tar, after all, is a mixture of substances; lots of volatile hydrocarbons "boil off" as it cures, leaving pores and cracks where water can enter. The new plastics are better, but they are hard to put down perfectly (no roof is completely flat; instead, it will have high and low spots) and hard to seal tightly against all the apparatus that sticks up through a roof. (These last expand and contract at different rates as the roof heats and cools.) And plastic degrades in the sunlight that beats down on it every day.

Dirt turns out to be a miracle roofing compound. Its natural milieu is exactly that harsh environment that wreaks such havoc with roofs. Consider: dirt is composed of small particles; it can flow. It moves when vent pipes or other obstructions expand and contract, keeping tight contact. Dirt dampens the swings in temperature that crack roof materials. Farmers well know how long dirt takes to warm up. And dirt reduces oscillations between wet and dry, maintaining a more constant moisture. A layer of dirt protects the roof itself from wind abrasion and keeps sunlight from reaching any plastic membrane underneath.

James W. Hudson is an apostle of rooftop planting. A chemist by training and an OSS agent during World War II, he is now a design consultant and engineer. He has always been innovative, coming up with ideas like perforated beams and joists that carry electric and telephone wires without sacrificing any strength. It is he who so eloquently reels off the advantages of dirt on the roof. As he talks, he sketches different types of roof construction and argues that almost any building can support some kind of garden on top.

For about $1,000, he says, engineers can determine the load-bearing capability of a roof. The inspection is absolutely necessary, he feels. In theory one could go to the original design drawings, but in practice the specifications may not have been followed. When competent engineers look at the structure from underneath, he says, no guesswork as to what the roof can stand is involved. (Hudson is adamant that no one under any circumstances should put extra weight on a roof without calling in the engineers. "Don't do it yourself" is the first rule.)

But with proper precautions, Hudson says, almost any building can take plant-

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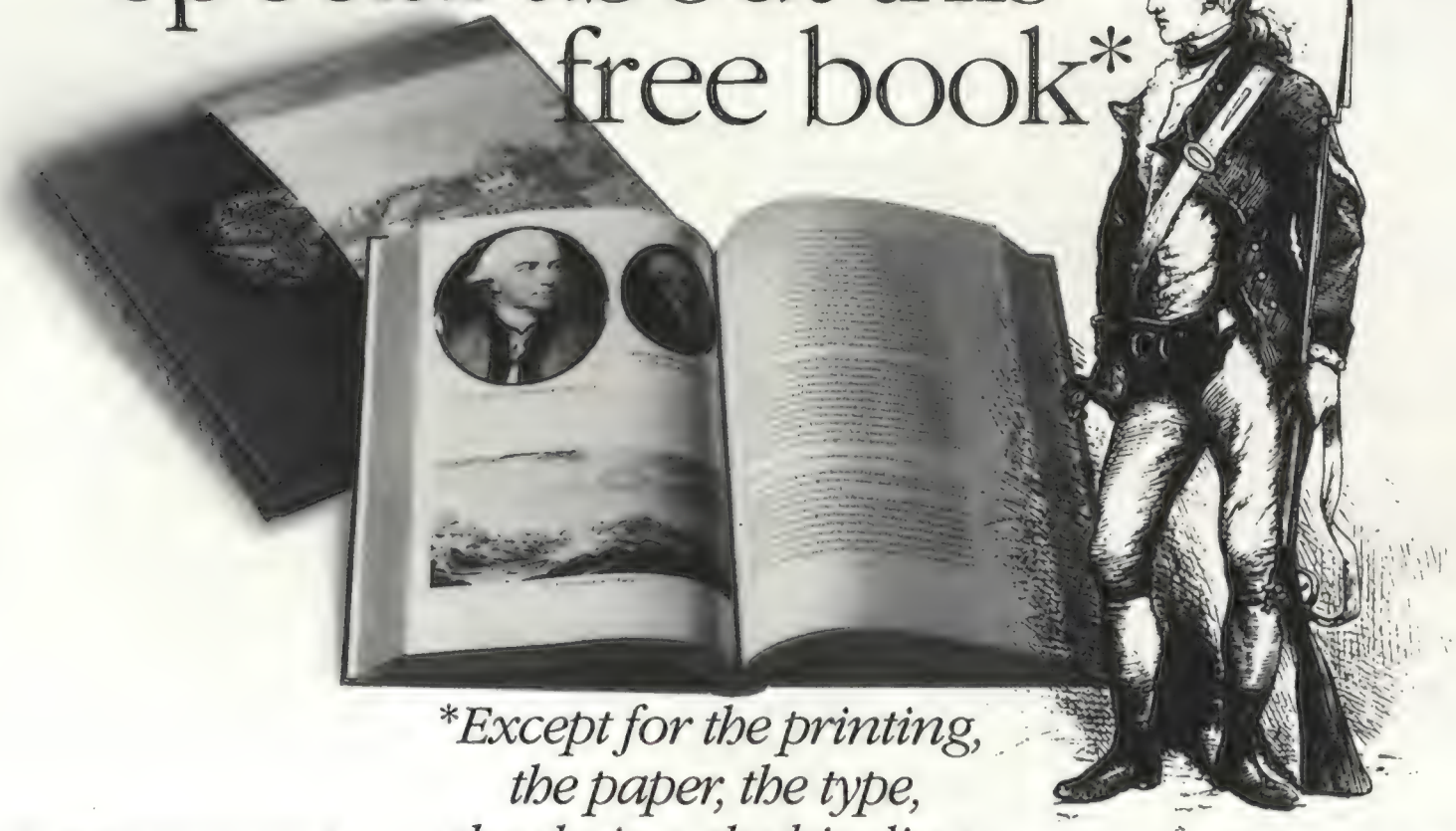

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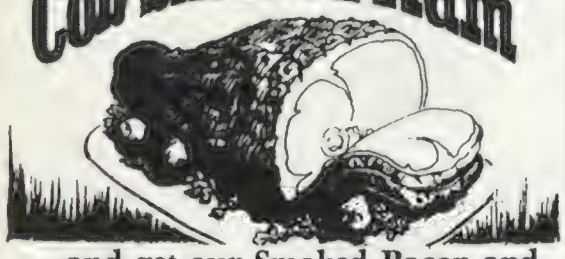

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ing on the roof. The design strength of many older buildings, based on the average expected snowfall, is usually about 30 pounds per square foot. But the columns supporting the roof can bear thousands of pounds. So if need be, the first step is to build a planter that spans all or part of the roof. Particularly heavy items, like trees, can be planted near the columns.

Planting a roof is not just possible in theory. Decorative gardens adorn the roofs of buildings all over the country, like the five-story parking garage at the Kaiser Center in Oakland, California. In New York City a warehouse roof has been turned into a commercial hydroponic garden. And plantings can be as elaborate as a designer wants: one rooftop garden in London has thousands of species growing in it (p. 42).

Over and above their value to the buildings involved, roof gardens can be pleasant parks and even playgrounds for the people who work and live in them and a pleasant sight for those in surrounding buildings. They benefit the whole area. By their mere presence, plants act as passive traps for dust and soot. Plants in leaf have a tremendous surface area, which makes them better collectors than, say, a vent pipe. Their unique contribution is photosynthesis, in which plants take in carbon dioxide and give off oxygen. Rooftop gardens could do for city air, in a small way, what bubblers do for an aquarium.

And they could be refuges. Birds certainly will come. Canada geese have nested on the bare tenth-floor balcony of a bank building in St. Louis. And a recent experience at Rutgers University, while not involving a roof garden, may be instructive. On a very urban campus in Newark, on a small plot surrounded by concrete buildings and a parking lot, there stands a greenhouse. Some of the area outside is wild, some cultivated. According to a report in *American Birds*, both areas are being used by birds. Wood thrushes and ovenbirds have been seen there, as well as catbirds and a number of others.

Imagine if that plot had been on a roof, so that the birds did not have to come down below the level of the adjoining buildings to get there. One could reasonably expect that even more birds would have dropped in. In fact, imagine what a city looks like to a bird flying overhead.

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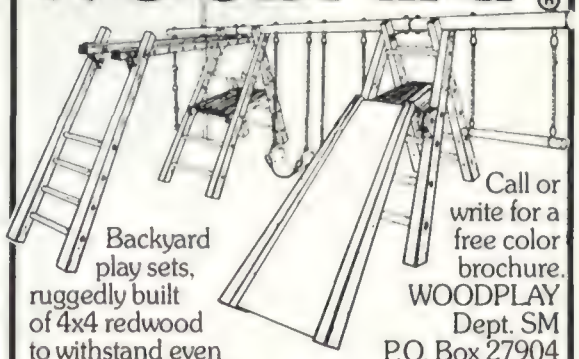

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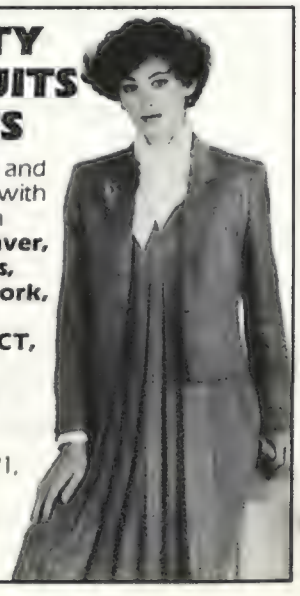

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Mostly the bird would see a totally alien landscape of tar and plastic surfaces, sterile stretches with no cover, no food, no water. For it, the city is only a place to be flown over. But suppose the same bird looked down to see islands of green bushes and shrubs, even small pools and waterfalls, rising up to invite it. Now the bird has the option of stopping. At least some will move in at the slightest opportunity (*Phenomena*, February 1984).

The greening of cities seems to me to be an unequivocal good. I have always thought that certain things in life are virtuous per se. Buying a book is one; it is tangible support for the life of the mind. Planting green things is another; it always improves our environment. Something in us needs at least a touch of the natural world. We do what we can. We may start with a few houseplants and go on to a wall of living green. We may attach a window box to the outside or fill a terrace with potted plants. A backyard can be transformed from a sterile expanse of struggling sod into a garden that offers endless refreshment for the eye. For those so inclined, the National Wildlife Federation can help turn a backyard into a pocket refuge.

Even cities, the seeming antitheses of landscape, are softened by greenery. The hard surfaces, the straight lines and right angles are less harsh when their geometry is broken by plants reaching for the light. A few trees along a sidewalk, a vest-pocket park in the middle of a block can work wonders. Higher up, any place where there is a balcony or a ledge, humans instinctively try to grow things. Inside, in their apartments and offices. And outside, anywhere they can put a pot or a tub. Some cities are famous for such efforts, cities as disparate as Rome and London. But the effort goes on everywhere, and all cities are the better for it.

Hudson and his fellow enthusiasts want to go further, to plant entire roofs, to turn whole cities into gardens in the sky. His good news is not only that it can be done, but that it is a practical thing to do. I try to imagine what it would be like to gaze out of an office window in some high building, and look across and down at a succession of gardens, parks and refuges, a steplike sequence of green places thrusting up to the light. I like it a lot. I say we go for it.

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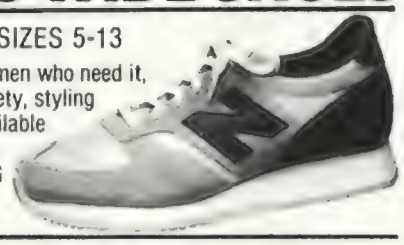

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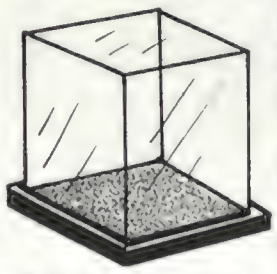

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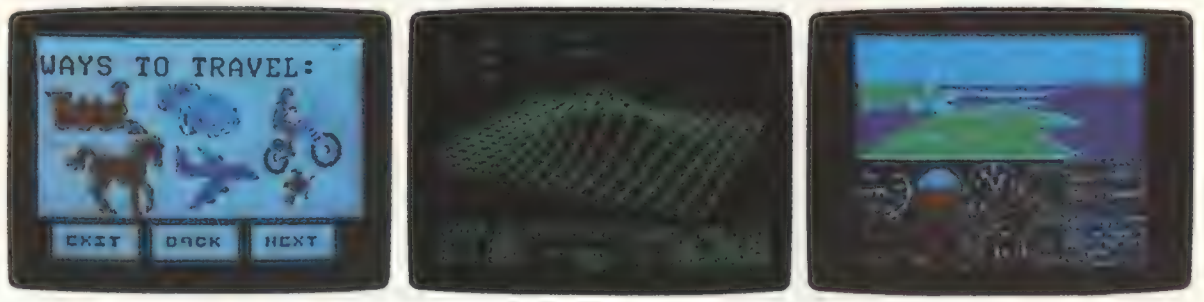

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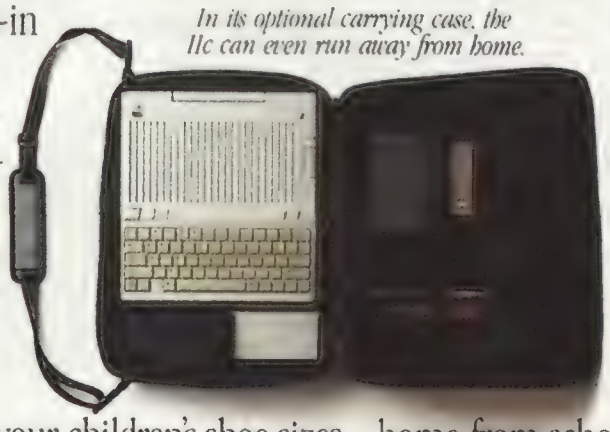

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By James R. Chiles

The Great American Junkyard: going from wrecks to riches

Whether old-fashioned lots or newfangled boutiques, things are humming as they support our love affair with elderly autos

Millions died in America last year, mostly in calamities: collisions, dives over cliffs, fires, floods. People drove them to it. Others were abandoned on the streets, to be attacked by urban gangs.

Shed no tears: these are automobiles on their way to the salvage yards. Further, with the parts they contribute, wrecked cars breathe new life into tens of millions of other cars, particularly the older models. Americans are crazy about old cars—fins, bulges, portholes and all. The average age of automobiles on the road in fiscal 1983, the latest figures available, was 7.4 years, the highest since 1950; 29 million cars registered in the United States were ten years old or older.

Some countries are less enthusiastic about these veterans and their upkeep. The British don't allow salvage yards in metropolitan areas and the Japanese disdain to buy used cars and used auto parts. Even in America, salvage yards are the ragpickers of the multibillion-dollar, multinational auto industry. They're usually grubby, a little dangerous, often frustrating—and fun. They're the unkempt museums of the car maker's art. Here, a customer can find the exact make and model of car he rode in as a youth. If he squints a little, it might even be the same one.

A day of scrounging through an old-fashioned salvage yard is an Easter-egg hunt for adults. It's the village water pump, the potbellied stove in the general store. Here, in a ritual as old as the spark-plug wrench, car owners meet on sunny Saturdays to bark knuckles, smear motor oil on their foreheads and lay out cash for ring gears. Hardscrabble front-yard mechanics swap know-how with antique-car collectors.

Salvage yards, I discovered, are at least as diverse as snowflakes. At one extreme is the traditional junkyard, with the possibility of mud up to one's knees; way at the other end, the yards are organized, clean and even computerized. In exploring them, I'd be visiting both, so I decided to dress accordingly: work boots and Canadian Army pants for the mud, and an Oxford shirt for the fancy sites.

The fancy salvagers are a new, high-tech and mostly metropolitan phenomenon. They have showrooms that are comparable to those of new-car dealers. They offer steam-cleaned, tested and guaranteed parts at prices that are only a fraction (generally one-third to two-thirds) of what new parts cost. Mechanics remove major parts with power tools; computers tell them which parts to keep and which to scrap. Outside, their wrecks sit in neat rows, organized by make and model. They advertise in newspapers and offer toll-free numbers. Yards specialize. They may sell only Chevrolets or Mustangs or foreign makes. One Arizona salvage yard sells only hubcaps. Concerned about muddy feet? An Oregon salvage "yard" with 350 cars is entirely contained in a six-story building.

Contrast this with the classic junkyard—and here's a quick way to assemble one: take several hundred old cars, trucks and appliances, and enough bedsprings to bounce a hospital ward. Age everything in water for a year. Then load the hulks into a fleet of bombers and drop them into a patch of weeds. Don't stop until they're heaped three high. Now bulldoze a web of muddy lanes through the morass with an oil-streaked tractor, move in an old gas station and pack it with ten tons of wheels, batteries, axles and radios. Finally, chain a mongrel to the gate.

Diversity, even disarray, are no strangers to the paradoxical world of auto salvagers. In this bizarre market-

In Pick Your Part yard near Los Angeles, a weekend mechanic loosens battery holder using her own tools.

At Linder's in Worcester, Massachusetts, Dave Channell fills out an inventory card for new arrival.

Carefully marked, inventoried and lined up, salvaged oil pans in one of Linder's stockrooms await buyers.

In the yard of Vintage Auto Parts near Seattle, 1950 Buick Super lies in wait for another aficionado.

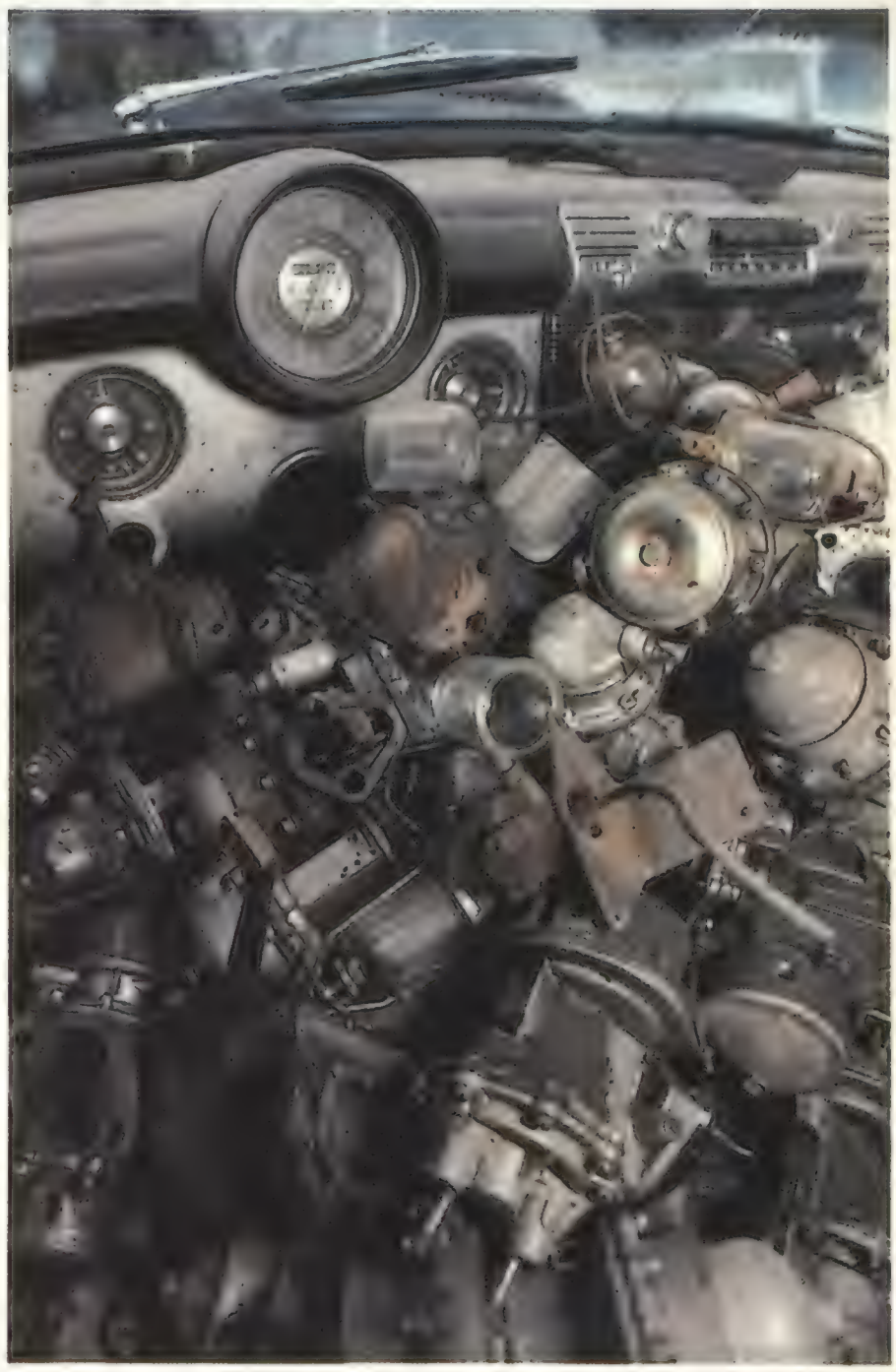
place, left front doors are more valuable than right front doors. Engine models that don't hold up generally cost more than engines that do.

My introduction to salvage yards came in the summer of 1977. I was helping my brothers build log houses back then, and my duty one August day was to drive their 1958 GMC two-ton truck, heaped with oak logs, through a city to a building site. I should have guessed that this venerable truck, which had spent nearly all its miles on deserted country roads, would finally break down on a major two-lane artery at rush hour. A desperate repair with an iron pipe lasted just long enough to stall us in the fire lane of a large and busy supermarket. I ended up at a small, friendly establishment called Truxan Parts in Springfield, Missouri. Thanks to that yard, the old GMC still runs.

In the face of fashion, friction and rust, America's fleet of old vehicles rumbles on. Why do their owners go to the trouble? "I feel like I've been selected by fate to take care of it," college instructor Delmar Wipf explained. He bought a 1930 Model A Ford 16 years ago at an estate sale dispensing the wordly goods of a

Unlike the weed-choked yards of lore, more modern ones like Vintage are surfaced in concrete and gravel.

In Vintage's showroom, cofounder Terry Jarvis holds his prize 1933 Ford grille—"a work of art," he says.



Fuel pumps stockpiled inside 1951 Buick Roadmaster at Vintage will be sent out to rebuilders, then sold.

South Dakota gravedigger. "When I saw it, I knew I would have it the rest of my life."

"The day doesn't go by that somebody doesn't wave," said Tommye Hughes of his restored Chevrolets, dated 1957 and 1959. Hughes works at a bottling plant in Dallas. "I've been pulled over at 3 A.M. and told that their dad had this car, or they owned one in high school. It's the dependability. It's a simple motor," Hughes went on. "I know it inside and out. I can crawl inside the motor compartment and change spark plugs in five minutes."

For most owners, maintaining an old car or a truck means weekends visiting obscure rural junkyards for replacement parts. "If you like a challenge, try to find parts for old European cars in American salvage yards," said Turner Collins, a college professor who owns eight foreign sports cars. Owning an old car might be a case of simple economizing, or it might be the symptom of a serious infatuation. Here's an easy two-word test to see if you fall in the latter group: the words are "road salt." If you're a car lover, you'll shudder at the thought.

Big date at Pick Your Part: Felix Marquez hunts for a bolt as his girl friend carries a Ford grille.

"Rust is the main killer of cars," said Steve Gray of Springfield, Missouri, who owns three vehicles, none newer than vintage 1957. Salt eats out fenders, exhaust systems, springs and the frame. Gray has spent many happy hours restoring cars. Restoration means taking the whole thing to pieces. He'll clean and scrutinize each part and replace it if necessary. He doesn't start, though, till he's collected most of the salvaged parts he thinks he'll need. "You have to know where to look and exactly what you're looking for. My philosophy is not to get in a hurry." He prefers to visit salvage yards in winter—the underbrush is lower and there are "too many snakes in summertime."

"I can usually find what I'm looking for," said Beto Salazar, who owns two 1952 autos. "I have an established route of junkyards." Salazar is president of a lowrider car club in Grand Prairie, Texas. He prefers the older, more remote junkyards for their lower prices.

Lowriding is a creation of the Mexican-American community in the Southwest. On weekend nights they meet to creep and hop around city streets in a jovial, if slow-moving, procession. Lowrider cars are commonly customized with streamlined bodywork, dropped suspensions and hydraulic lifters powerful enough to make the cars jump off the pavement.

Because lowriders have a strong preference for older American cars, salvage-yard owners are no doubt pleased by the hobby's growing popularity. When Salazar finds parts at a yard that he knows are in demand, he'll buy them all and sell them off at swap meets. By visiting these meets regularly, some car owners are able to stay out of the salvage yards entirely. It's a support network typical of old-car owners.

Sharing tools and inside information

This mutual aid can be as simple as swapping tools in a salvage yard. When I spent an afternoon at Foreign Car Auto Parts in Upper Marlboro, Maryland, none of the customers seemed to have the tools he needed, but all got along. Mike Beatley, owner of a 1964 Jaguar, got pliers from another customer. An off-duty Washington policeman talked the yard's mechanics out of a pair of screwdrivers despite signs that said borrowing was forbidden.

Even more valuable than tools is inside information from other old-car owners about where to find the salvage yard with the right pieces. It may be hundreds of miles away. Jane Scholl, of SMITHSONIAN's editorial staff, has accumulated "a list of cannibal car places as long as two arms" during searches for parts to repair her 1961 Buick LeSabre convertible. She's driven out to one small yard in West Virginia three times; like many of its ilk, that yard still uses dogs to guard its premises at night.

Salvage hounds at Pick Your Part work over some open-hooded wrecks. The fellow at center brought his tools in a cardboard box; all must provide their own, which—along with elbow grease—they share freely.

Labor and land prices are going up all over the country, and rivalry is stiffening. Factories compete with salvage yards by manufacturing new replacement parts for popular-model autos. In Los Angeles it's not unusual for a late-model wreck to attract 25 to 30 bids from salvagers at the insurance company auctions. Pushing wreck prices up further are auto-theft rings that pay lavish prices for new wrecks—not for their salvage value, but for their identification papers and numbers. The rings use these to legitimize stolen cars.

Other criminals depress resale prices by stealing cars and cutting them up for parts—"chop shops" in the jargon. The most popular are front-end body parts and doors; not popular are engines and transmissions because those carry individual identification numbers and may be traced. Some of the chopped parts will move into the shadier, lower echelon of salvage yards—those that carry little or no documentation on what they sell. Legitimate yards, on the other hand, can account for the origin of most stock. Auto-body repair garages probably consume most of the chopped parts. In fact, a Philadelphia detective says that some crooked auto-body shops will hire thieves to steal late-model cars for just one assembly, such as a door or a front end. The cars are typically abandoned on back streets, where scavengers quickly strip them; or they are immediately shredded to destroy all evidence. "Auto theft is one of the worst things we have to deal with," said Joe Rogers, a Missouri salvager. "We can't compete."

"There's no question that a shakeout is under way," said Barry Isenberg, a salvage-industry consultant based in Cupertino, California. His company sifts through the accounts of 250 salvage clients each month. The majority are losing money. But a minority are doing extremely well. "There are about 14,000 U.S. dismantlers," Isenberg said. "Of those, I doubt that five percent could be called businesses. The rest are run by ex-service-station operators, body men and tow-truck owners. It's very similar to the way things were done 50 years ago."

Bridging the gap between the old-time junkyards and the computerized auto salvagers are people like Terry Jarvis. His company, Vintage Auto Parts Inc. of Woodinville, Washington, sells parts for the older cars that

The author, who wrote about safecracking in the July 1984 issue, is prowling the salvage yards to find parts for his vandalized Volkswagen Rabbit.

Eight miles west of Amarillo, roadside sculpture entitled *Cadillac Ranch* memorializes the old chariot.

junkyards specialize in, but uses the sharp management methods of the high-tech salvagers. Leanness and meanness aside, though, it's clear he shares his customers' nostalgia for old cars.

To understand how much cars mean to Jarvis, you have to know that as teenagers he and his brother Jon dismantled more than 100 Fords in the front yard of their parents' Seattle home. They sold most of the parts, but Jarvis kept the chrome grille off a 1933 Ford under his bed. "You always have a part you covet," he said fondly, and I could almost see the glint of chrome in his eyes. He still owns it—it's hanging on the wall by his office door like a trophy.

When we talked, Jarvis wore a striped shirt and green shorts. With his glasses, slender build and gray-specked beard, he looked like a professor on holiday. The front-yard salvage "created a lot of tensions in the neighborhood and the family," he reminisced. "Of course, when you're 16 you can do anything." Several years later the brothers moved out of the front yard and into a business.

In an inspired use of '63 Chevy, artist James Croak merged modes of transport that conquered the nation.

Now the business is part salvage yard, part warehouse and part library. It stocks 500 cars on ten acres. Most are antiques or special-interest vehicles. There's no mud in sight—the cars sit on concrete pads and gravel. The warehouse holds many shelves of "new-old" auto parts, most of them still in the original packaging. Cylinder-head gaskets are filed like dossiers, marked by metal dividers. Generator brushes are kept like wiry preserves in the original manufacturers' glass jars, vintage 1930. How many parts in all? Millions, said Jarvis.

Jarvis and his brother spent more than two decades fishing these parts out of the defunct dealerships, attics and basements of America. How to know what fits what? Vintage's fireproof library vault holds thousands of parts catalogs dating back to the First World War. They even sell a catalog of their own.

The countermen greet customers in a boutiquelike showroom. Antique fans on the high ceiling flap the fronds on big green ferns. Well-stuffed chairs extend their arms in welcome. Chromed auto parts rest on stately green and red velvet, in oak-and-glass cases.

We went back to Jarvis' office after the tour; he hurried a black cat ("our junkyard cat") off my chair. "Just what is the difference between old and new cars?" I asked. "Why are people so devoted?" He thought for

The work was commissioned by Stanley Marsh 3, and is by a group of West Coast artists called Ant Farm.

a moment, then answered without the chauvinism that many old-car buffs display. Cars made in the Thirties through the Sixties, Jarvis said, "are modern enough to be comfortable and serviceable. They're powerful, big and roomy. Back then, when a Buick went down the road, there was no mistaking it. But the real difference is that new cars don't lend themselves to being fixed by the amateur mechanic."

Handling those late-model cars is the job of high-volume, mostly urban salvage yards. Because competition is hottest in this wedge of the salvage market, they're the most receptive to new ideas in marketing, inventory control and management. One of the snazziest of the new generation is Lakenor Auto Salvage, located in a Los Angeles suburb. General manager Herb Lieberman's father and grandfather started the business in 1952 out of a small metal shed. Today, they operate out of a tile-trimmed front office that looks like a suburban bank. Lieberman keeps the founders' rusty old shed in the back of his otherwise ultra-modern four-acre lot.

Lot space is so tight here that Lakenor stacks its wrecks on racks, three high. Inside the warehouse, mechanical parts all have places on a three-story set of racks to keep them out of the weather. "It took longer to design the racking system than the building," observed Lieberman.

In Lakenor's showroom I found customer Jim Phelps waiting for mechanics to retrieve a pushrod for the engine in his 1971 Eldorado. As the owner of six cars, he does a lot of part hunting. He'll drive up to 50 miles to find a part. "This is one of the best wrecking yards around," he said. When Phelps is not out hunting down car parts, he works as an aircraft engineer.

An engineer in a salvage yard? The arrival of the clean, efficient yard has widened the used-parts clientele from front-yard mechanics to a typical retail mix. "We're now seeing housewives, and businessmen in three-piece suits coming in on their lunch hours," said Paul Kawolis, an executive with Linder's Inc. of Worcester, Massachusetts. Linder's is one of the busiest auto salvage yards in the country.

Some customers come only to buy parts on behalf of a shop that's working on their car. A middle group will tackle the whole repair themselves. The most dedicated will personally strip the wrecks. Targeting *this* cost-wary crowd is a Spartan variation on the modern salvage yard: the high-volume, self-service operation. On a hazy Saturday afternoon I visited the Pick Your Part Auto Wrecking yard in Sun Valley, California. It's only about 30 miles northwest of Lakenor Auto Salvage, but it's worlds away in comfort and pricing—both are at a minimum.

At 1 P.M. I was standing in a lot full of wrecked cars. All around were the steely sounds of open-hood surgery: the snickety-snick of socket wrenches, the hollow thud of hammers on fire walls, the busy rattle of tools in toolboxes. And the whir of a chain: two customers were pulling an engine out of a brown Toyota with a portable hoist. The engine got hung up and the man wearing a white shirt thrust a pike in to cut something loose. I heard a pattering and saw red transmission fluid, clearer than blood, running onto the dark dirt as they heaved again and the engine swung free.

1) Saturday the 22nd, 11:30 A.M.: a wrecked Datsun pickup arrives in yard; by noon, left door is gone.

2) Saturday the 22nd, 2 P.M.: while one customer pries out the water pump, the other rolls tires away.

Already that day hundreds of people had paid 50 cents admission to enter this 16-acre urban preserve.

Customers scurried for cover as oversize forklifts hustled fully-stripped cars out of the rows and down the lanes to a big orange crusher. They rumbled back with fresh prey held high (many were abandoned cars purchased through police garages). Mere seconds after a forklift set down a foreign station wagon, a half-dozen people gathered to pull and pry at it. Self-service yards offer extremely low prices: car doors for a flat $22 and eight-cylinder engines for $110 if the customer brings in his old part.

Somewhere in between the glossiness of Lakenor and the utilitarian sparsity of Pick Your Part is Saw Mill Auto Wreckers' yard in Yonkers, New York. It's been in business here, among the frame houses of Yonkers in a narrow industrial belt following the Saw Mill River, since 1946. Saw Mill dismantles and sells 2,500 to 3,000 cars per year out of this four-acre lot.

I waited for assistant general manager John Cilento, son-in-law of president Joe Americo, to finish his transactions. Cilento stood at a desk, holding a phone receiver to each ear. But his head and elbows were free and when somebody at the counter in the next room had a question, he gestured an answer through the door. He was uniformed in blue and wore a short-trimmed beard. Behind him were 11 clipboards stuffed with receipts, clinging to wall hooks. Near the door the paneling was worn at shoulder and hip level by years of leaners. Two open telephone circuits muttered fuzzily from speakers placed at opposite corners of the small room.

Each of these circuits, called "long lines" in the trade, can connect a yard with dozens of others for searching out an elusive part. Each functions like a full-time party line. Countermen pick up a receiver, bellow out the name and model of the part they want and hope somebody will reply.

4) Thursday the 27th, noon: intrepid mechanic enters now-bedless truck for windshield-wiper regulator.

Most of the room's red-and-gray linoleum floor was taken up with a long table and another desk. The second desk held a computer terminal. The screen glowed with green columns of numbers. In a different setting it might have looked swank. Not here: heaped on the beige monitor were an old car radio, a blue pulley wheel, a tube of lubricant, a coffee cup and a stack of legal pads. The keyboard was stained with the dark fingerprints of somebody who had been handling engine parts.

We walked around Saw Mill's yard and stopped to watch the mechanics strip a car with air tools. Moving on, Cilento explained that some customers are re-

3) Sunday the 23rd, 11 A.M.: the ceiling-liner support post has been taken; now, the alternator is going.

5) Saturday the 29th, 11 A.M.: next to go is the brake caliper, which customer is now looking over.

builders who have made a specialty of repairing cars that look hopelessly wrecked. We stopped at a 1983 Eldorado in the front lot; it was black with red plush upholstery. "This came in burned," he said. "The guy welded on a different roof, replaced the door with a salvaged one and put in a salvaged interior." He showed me the weld joints, which were nearly invisible. "That hulk came back as a $15,000 car."

Among the modern salvagers, parts pricing is based on supply and demand. Demand is set by how many cars of that type are out there and how often they get in trouble. The parts best in quality are frequently the hardest to sell; owners don't need replacements.

One fast mover is the left front door. "The most popular door is always the driver's door, by two-to-one," said Joe Simone of Hunts Point Auto Wreckers in New York City's South Bronx. That's due to left-turn collisions and to passing cars that tear off the door as the driver starts to get out in traffic. New York's rugged streets also consume truckloads of brake rotors and suspension parts. Simone has a computer rummage through his inventory list every six months to finger slow-moving parts for disposal.

Salvagers have been scrapping many of the unsellable parts, but more and more they're discovering buyers at long distance. West Texas farmers want good used engines for their irrigation pumps. Washington State needs Arizona's excess of used windshield-wiper motors; Arizona needs Washington's air conditioners. Detroit drivers want fenders to replace those eaten by road-salt rust. Surplus parts go via freighter to Israel, Lebanon and Australia.

American salvagers are buying over long distances, too. Linder's of Massachusetts has sent its buyers out in a corporate airplane to pick up hail-damaged cars from Texas and flood-soaked cars from Indiana. Fitz Auto Parts of Woodinville, Washington, buys two containerloads of used engines from Japan each month.

"The Japanese don't like to buy used cars, or anything used," said Lewis Simons, a correspondent for Knight-Ridder Newspapers based in Tokyo.

6) Monday the 31st, 3 P.M.: diehard peers into hood of stripped-down truck—it's been picked pretty clean.

Lisa Haug is lucky owner of everybody's dream car, a '56 T-bird, restored with parts from specialty yards.

"The people turn over their cars every three years and buy new ones." Also nudging them to buy new is a national auto-inspection fee that escalates as cars age. The result of the fee and the throwaway ethic is a used-car market so depressed, he said, that he heard the owner of a mint-condition Datsun 240Z offered to sell it for $400 and still couldn't rouse any interest. The annual inspection fee for the ten-year-old car was $700.

What happens to the unwanted used cars of Japan? Though they are typically only a few years old, low in mileage and well maintained, many countries can't use them because they're built around a driver's seat on the right-hand side. "I watched them drive used cars off the transporter, cut the engines and transmissions out and scrap the rest," said a Los Angeles auto dismantler who visited Japan in 1983.

All cars must die, but recycling and scrapping have not always been the end of the road. Rural counties have used old cars for erosion control on riverbanks, and biologists have dumped them off New York Harbor as simulated reefs. And, too, cars can be art. In 1974 a group of San Francisco artists known as Ant Farm planted ten Cadillacs nose down in a Texas wheat field belonging to Stanley Marsh 3. The same year Los Angeles artist-inventor Phil Garner assembled several furnishings from cars he'd found in San Francisco salvage yards. A sofa that he built from the rear end of a 1954 Chevrolet Bel Air had working taillights.

After some months of musing about old cars, old salvage yards and how they fit into the cosmos, I've decided nostalgia needs at least ten years to germinate. Consider this excerpt from *The Insolent Chariots,* a book written by John Keats: "In times past, a dented fender cost perhaps eight dollars to repair. Today, mechanics must strip the entire side from the machine to iron out an insignificant wrinkle. . . . In view of the Model T's widespread acceptance, it seems proper to wonder why the thing is no longer made, or perhaps, it is more proper to wonder why, with our increased technical ability, there is not now a cheap, safe, practical, simple, sturdy and economical American automobile on the road."

This book was published in 1958. That's the year my favorite GMC truck was built; a year in which, many enthusiasts now say, cars were stylish, cheap, sturdy and easy to maintain. It's not unusual today for restored 1958 models to sell for more than they did when new. I have no doubt that some of this year's new models will be in desperate demand in 2020, when most of us are complaining about the latest aircars.

Parts for sale at Vintage include 1940s Ford horn-blowing ring (lower left) and a spiffy Hudson hubcap.

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Coffin of Petosiris, fourth century B.C. (Courtesy of the Egyptian Museum, Cairo).

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By Alison Jolly

A new science that sees animals as conscious beings

Cognitive ethologist Donald Griffin believes primates can lie and even bees can think, and he is not a lone voice in the wilderness

A piping plover scuttled along the seaward edge of the sand dunes. It looked and moved like a clockwork toy. A round white face surmounted its sand-colored body marked off by a necklace apparently drawn in black crayon. A pair of yellow legs twinkled along below. It ran not away from but toward the danger that threatened its brood.

The plover eyed the danger, then went into paroxysms. It peeped like a digital watch in high distress. Its wings arched, jerked and fluttered; its tail fanned out and down. It staggered down the beach, wobbling from side to side like a child's top about to fall over. But then, in midconvulsion, the plover stopped again to cock an eye over one shoulder, monitoring the predator's approach.

The danger, a bikini-clad student, did not actually want to eat plover eggs. "Angela, here," she said into her walkie-talkie. "I have a broken-wing display six meters south-southwest. Over."

Carolyn Ristau, a hundred feet away on the sand, answered, "Right, Angela. We have it on tape. Keep walking parallel to the dunes—and keep staring out to sea." Ristau, a scientist in the new field of cognitive ethology, peered through a spotting scope, dictating notes, while Karen Seidler, another student, ran the video camera beside her. In the momentary pause the plover circled back toward Angela Greer, and again began to peep and flutter. The student walked a preset course, not responding to the bird, but the bird seemed to adjust its actions to hers, attempting to lead this radio-toting menace away from the nest of eggs in the dunes.

Ristau and her students are no danger to the plovers. Indeed, they are very careful never to harass a bird to the point of its abandoning eggs or chicks. The scientific establishment, however, might regard them as a very serious menace. For three field seasons Ristau has conducted experiments to investigate whether piping plovers have conscious minds.

This attempt signals a revolution in the scientific study of animal behavior. For 50 years scientists have banned animal consciousness as a subject unfit for discourse. Psychologists from Pavlov through the disciples of B. F. Skinner prefer to study animals as stimulus-response machines. Zoologists ask about the long-range, evolutionary function of behavior, but distinguish sharply between purpose evolved over generations and conscious purpose. Even human beings pursue some goals without being aware of them, these scientists point out, and much of animals' goal-oriented behavior may be of this nature. It's an open question. Normal people may talk to their dogs and cats, but as scientific evidence that doesn't count.

Donald Griffin of Rockefeller University is now turning the logic of science itself against traditional scientific thinking. In his new book *Animal Thinking*, he argues that consciousness is an evolved ability, like the ability to breathe or reproduce. Consciousness evolved because it is efficient for an animal to organize its behavior in terms of mental images and mental goals. It is not an extra, outside power, and certainly not a supernatural power, any more than breathing is an outside force imposed on the lungs. Conscious thinking is what the brain *does*—even the brains of animals.

Calling humans unique is "conceited"

It is probably impossible to prove that animals are conscious. "Almost any concept can be quibbled to death by demanding sufficiently rigorous definitions," Griffin says. But to disprove it is equally difficult. That means assuming that humans with nervous systems much like other mammals' have developed a totally unique ability. The argument comes down to parsimony: Is it more cautious to believe or to disbelieve in the uniqueness of human consciousness? Arguing that human brains are divorced from the animal kingdom, Griffin maintains, "is not only unparsimonious, it is conceited."

Rhoda, 20-year-old rhesus matriarch makes O-mouth gesture of threat, but is her expression conscious?

Aware of intruder, a plover begins a characteristic "low run" calculated to lead predator away from eggs.

Angela Greer strolls on beach to disturb piping plover as Carolyn Ristau follows action with spotting scope.

Any animal confronted by a complex choice of actions might benefit from waiting to calculate the consequences of the choice, and from comparing its results with some mental goal. Scientists have assumed that most animals do not think in this way, and that their behavior is largely a matter of direct, preprogrammed responses to environmental stimuli or cues. Even the learned behavior of animals such as rats in mazes is regarded as a form of rote behavior more like a conditioned reflex than like conscious thinking.

But observed in their natural settings, most animals seem to routinely face choices too complex to be programmed simply, either through learning or innate behaviors such as instincts. In such cases, the mind may have to reflect back upon itself—to think before acting—and the resulting act may be determined as much by inward mental activity as by outward stimuli. But do such inner mental processes necessarily imply consciousness?

What criteria lead us to judge that a particular behavior is conscious? What is the difference between the eight-month baby who clumsily knocks over its milk, and the two-year-old who obviously does it on purpose? Several things incline us to judge that another being is acting consciously: if it studies its goal before acting, if it chooses one of a very flexible set of behaviors, or even a novel behavior with detours to reach the goal. Conscious purpose seems especially likely if some learned symbol like "No! Naughty!" communicates the situation to the aggravated parents. Finally, if there is misdirection—hiding or lying—it seems likely that the creature has formed some con-

Plover gives "broken-wing display" to keep predator's attention, but is it acting on instinct or intention?

ception of other animals' intentions and awareness.

All these aspects appear in animal behavior. Take, for instance, the distraction display of the piping plover. Before Ristau's experiments, skeptics could suggest that broken-wing display was a simple fear reflex, responding to a predator's approach when the bird is in a hormonal state of brooding eggs or chicks. Now we know the display is not simple. Birds appear to triangulate a predator's movements and their own. They position themselves between the nest and the approaching danger so that the predator is seldom led toward the brood, but away at an angle. If the predator pauses, a plover may even stop and reapproach, as it did with Angela, to pick up the lead again.

Plovers distinguish dangerous intruders from those that are more benign. A "dangerous" experimenter is a person who once or twice walked directly toward the eggs. The birds remember such previous intruders and react to them with more alarm. That is why Ristau's neutral observers now wear somber blue. If they conduct experiments, her students strip down to swimsuits or pull on extra shirts and hats and trousers to become dangerous ladies in white. This year's work may show that the birds are even sensitive to direction of gaze, as some initial observations suggest. Plovers that lay their speckled eggs high up in the dunes may silently monitor the approaching Angela as she gazes out to sea, while Margaret Mostoller, another student, may provoke that frantic digital peeping by staring inland at the nest as she walks nearby.

Any scientist would now admit the plovers' displays are complex, not simple. Ristau thinks, however, that she and her colleagues may be pushed to a whole new kind of explanation. The displays are so finely tuned to the "predator's" nearness, direction of movement, previous history and perhaps even gaze, that it becomes increasingly cumbersome to list the specific stimuli that can trigger a response. There is, however, a simple summary: the bird *intends* to lead a predator away. If it is so much easier for us to describe the plover's activities in terms of its goal, wouldn't it be efficient for the bird's own small mind to know what it wants?

Similar arguments could be made for other bird behavior. Herring gulls studied by Benjamin Beck cracked clams and whelks by dropping them onto hard surfaces—such as a parking lot or a rocky wall (the gulls almost never dropped the shells onto soft sand but flew inland to an appropriate target). The herring gulls let their shells go from a greater height over the parking lot, where there was no danger of missing the target, than over the wall, even though some shells did not always crack at first impact on the wall. Beck argues that sea gulls need general intelligence to weigh these two factors of force and accuracy against each other. Donald Griffin adds that if the gull has a conscious image of the clam hitting the wall, this makes such intelligence more understandable.

Dreams of a robot dancing bee

In his laboratory at Rockefeller University, the author of *Animal Thinking* bends toward an open observation hive of honeybees. He holds a tiny wind gauge beside a returning scout who dances on the face of the comb. Griffin suggests that analyzing animals' natural communication may give us a window into their minds. His windows aren't what you and I use when we communicate with our dogs and cats. It was Griffin who established that bats use sonar for echolocation, as described in an earlier book, *Listening in the Dark*. Griffin's ex-students are working on various types of animal messages, from whale song to the low-voltage serenade of electric fish. One former student, James Gould of Princeton, studies learning and information processing in honeybees. Griffin uses one of Gould's observation hives to analyze the precise components of the famous dance bees use to tell their hive mates the distance, direction and desirability of food sources. Eventually, Gould and Griffin hope to be able to build a tiny mechanical robot that can send out the messages of a dancing bee.

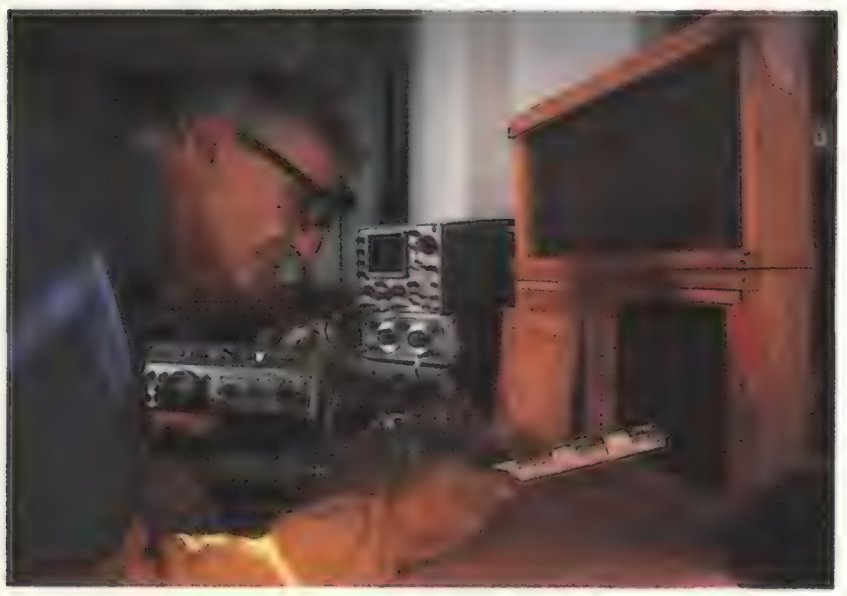
Bees have no eardrums. They cannot record the

The author, Guest Investigator at Rockefeller University, recently published a new version of her book, The Evolution of Primate Behavior.

pressure changes of sound as we do. Instead, their antennae and tactile hairs bend with the movements of air particles back and forth within the sound waves. Unlike an eardrum, such receptors are highly sensitive to direction. The buzz of a dancing bee may "sound" different to each antenna of her followers. Perhaps, on the other hand, followers must actually touch the dancer to receive her message.

To ask how bees sense one another's signals is highly orthodox sensory physiology: both respectable and technological. Gould, who is less sympathetic to talk of consciousness, has no difficulty in meshing this work with his own studies of bee learning. The strength of Griffin's approach is that he reconciles orthodox science with his radical view of consciousness. He sees no contradiction between studying mind and studying the mechanisms of mind.

Griffin is only one exponent of this recent approach, which is not limited to the cognitive ethologists. A small but growing number of philosophers and other biologists are exploring the implications of taking an "intentional stance" toward animals, a point of view that assumes that animals act as if they are conscious. It is relatively easy to see that consciousness would be useful to complex social animals, with their need for understanding the intentions of others. One of the clearest examples is cooperative hunting by wolves and lions. Griffin describes a hunt he watched in Kenya when two lionesses perched conspicuously on mounds, where a herd of browsing wildebeests could see they presented no threat. A third lion slunk down a ditch, close to the wildebeests, while a fourth circled around through some trees. The fourth erupted from the woods at the optimal point from which to panic the herd across the ditch where her partner lay hidden. The hidden lioness rose, made her kill—and all four gorged at leisure.



Donald Griffin uses specially designed wind gauge to study the sophisticated communication used by bees.

Griffin's explanation of such behavior is not merely that animals *act* as if they were aware. He says they *are* aware. And he does not confine his arguments to scheming lions and parading plovers. He claims that consciousness may be even more important to the small brain of a bee.

Do swarming bees "make a decision"?

When bees are seeking a new hive, Martin Lindauer showed in the 1950s, they fulfill all the vertebrate criteria for deliberate decision. If a dog hesitated before a choice, looked alternately in two directions, sniffed, proceeded a little way up each path and finally ran down one track rather than the other, we would be inclined to say he had made a decision. When bees swarm, the ball of bees hangs from a tree or house, and scouts search the area. If a scout bee finds a tree hole, she crawls inside. She explores on foot, measuring the dimensions of the cavity by walking around it. Ideally the new home will be dark, dry, clean, large but not too large, free of ants and with a narrow entrance to guard from predators. After the bee sizes up her find, she returns, and dances that same waggle dance she would use to show the direction and distance and quality of food. The dance itself is the most precise and abstract communication that any animal uses about the environment. It is true that the direction angles wobble a little, since follower bees must normally seek out a sizable patch of adjacent flowers rather than the particular blossom the scout has just drained dry.

When they dance about a hive site, dancers are indicating an entrance hole only a few inches across, but do not sharpen up their symbolic language accordingly. (This study was made by William Towne, a student

To measure air movement caused by dancing bee's wings, Griffin detects the pressure changes in two ways. Air waves cool a tiny light filament (top), changing current; microphone (below) records waves as sound.

of Gould's and therefore one of Griffin's many intellectual grandchildren.) The swarm then "debates" the information. After each scout's dance, a few other bees independently investigate the prospective nest sites. The scouts and their followers then attend other dances and, as Gould says, fly off to look at the competition. It may take several days for the bees to reach consensus. Then they swarm all together to the best available home.

Even ardent believers in Griffin's arguments may draw the line at bees. At the other end of the scale, almost anyone who associates with monkeys and apes assumes the animals are conscious, even if it is not fashionable to say so in the scientific journals. Of course we empathize easily—we are primates too. That doesn't mean we know it all, though. Close study of primate communication shows that monkeys are telling each other much more than we suspected even five years ago.

African vervet monkeys, for instance, give different alarm calls for leopards, for snakes and for eagles. If you are a vervet, you need to know which way to run. When you hear a vervet air-raid alarm, it's OK to take cover in bushes where a leopard might catch you. If you hear a leopard alarm, climb up to the tree twigs, exposing yourself to eagles. You can all come out on the open ground to chutter at a python, which would be a fatal mistake with either leopards or eagles. Robert Seyfarth and Dorothy Cheney, of UCLA, played back the calls to wild vervets and proved that the calls do indeed work like words to provoke the appropriate responses: this is not just a sliding scale of fear intensity. Furthermore, what the calls refer to seems to be partially learned. Baby vervets give eagle screeches to any soaring birds, or, in one instance, a falling leaf. Juveniles call only to hawks. Adults largely confine their calls to the dangerous martial eagle, out of all the local species of raptors.

Sally and Harold Gouzoules, of Emory University and the Yerkes Regional Primate Research Center, reasoned that if monkeys could identify predators, they might have equally precise signals about their own social world. Rhesus monkeys are the commonest laboratory primates. When at home, they live throughout northern India and Pakistan, thieving in bazaars, basking by temple pools and trudging through winter snow in the high Himalayas. They are "weeds," according to Alison Richard of Yale, who has studied their social structure in the wild. A rhesus troop is so adaptable that it is able to thrive almost anywhere at all.

Rhesus monkeys are not sweet animals. In a large

grassy corral at the Yerkes Field Station, where a troop of 45 animals lives together, many have stumpy bitten fingers, or slashed faces or missing ears. Wild ones are commonly in worse condition. Aggression is part of the rhesus way of life.

The core of the troop's structure is a series of matriarchies. A mother ranks above her own daughters until she becomes very, very old. She supports them in fights, so her offspring rank just below her and thus above all the other matriarchies that she can dominate. Young males commonly migrate to other troops. A male's adult rank depends on his own fighting prowess and on his charm—much of his status depends on whether the females of his new troop back him up. A female, on the other hand, is usually locked for life into the nepotistic matrix of her kin. Her adult rank is roughly predictable the day she is born. But female status changes do occasionally happen, and it is worth a young female's while to test the system. In the wild, predation and disease knock out relatives at random, so there is more flexibility than we see in our well-tended captive colonies. Wild or captive, kinship is still the major fact of female social life. A baby learns early those situations when its relatives will come and help—and when they won't.

Little rhesus monkeys recruit aid with five different types of screaming, which at first sound very similar to human ears. Noisy, blurred screams usually mean the baby is threatened by a dominant female. Arched screams, with rising and falling pitch, mean threat by a subordinate. Tonal and pulsed screams usually indicate that the attacker is a relative from the same matriarchy. Actual physical contact or attack is most frequent with noisy and pulsed screams; that is, an infant may be bitten by either relatives or dominants. Mothers key in to scream types, not just to urgency as conveyed by loudness and length of the screams. It isn't as simple as any rhesus mother's knowing when something is really wrong with her bawling child. In fact, when the Gouzouleses played back juvenile rhesus screams to the mothers, they found that mothers look quickest and longest toward the speaker if it plays noisy or arched screams. That is, mothers respond if any non-kin monkey is apparently scaring their babies, whether dominant or subordinate. They are more likely to ignore mere punishment that is meted out by relatives.

Calls such as the vervet alarms and rhesus screams function like our verbal symbols that refer to the environment, but in one way they are wholly different. They are tied to the situation. Rhesus babies don't sit about screeching to discuss past aggression, once their bitten tails stop hurting.

Great apes, however, can deal with learned gestures detached from the immediate situation. In spite of the controversies over ape grammar, it is undisputed that with human instruction all the apes can learn to use symbols somewhat like words. The great unsolved question is, of what use is such an ability in their normal lives?

As Frans de Waal points out, all our experiments with levers and tools and words may one day be seen

In unsociable encounter, one female rhesus threatens another who screams with a characteristic fear grimace.

Both monkeys glance toward the screamer's nearest relative, to see if there is a likelihood of intervention.

as handicaps we impose on the apes, to translate their behavior into our terms. We need them, just as we need electronic technology to interpret the honeybee. But the true intricacies of ape social behavior are still recorded as anecdotes. The new climate of thought means at least that the anecdotes are noted by careful observers, who take pains to be cautious about their own interpretations.

Jane Goodall was the first to describe deception in chimpanzees. Figan, an adolescent male in Tanzania's Gombe Stream National Park, learned he could lead adult males away from the banana pile by striding purposefully into the woods. The others followed him off; he then returned by another route to gobble unmolested. Even Figan occasionally got his comeuppance. Once when he had led a group of chimps from the camp, he returned to find yet another high-ranking male installed at the banana pile. "Figan stared at him for a few moments," Goodall later recounted, "then flew into a tantrum, screaming and hitting the ground."

Social intelligence has its advantages. Figan, with judicious use of aid from his older brother, is today dominant male in the Gombe Stream.

Frans de Waal gives many more examples of deception which seem deliberate by any criterion we would use for humans. He calls his book on the shifting power plays of the males in the Arnhem Zoo colony *Chimpanzee Politics*. His accounts, like Jane Goodall's, make it clear that chimps in some sense calculate others' intentions. They are even, in a real sense, self-aware. One series of experiments by Gordon Gallup involved anesthetizing chimpanzees and orangutans who were familiar with mirrors, daubing paint on ear or brow ridge, and seeing if the apes groomed these out-of-sight areas when they again saw themselves reflected. They did.

One of de Waal's most striking observations of deception concerned Luit, dominant male chimpanzee in the Arnhem Zoo, who was being challenged by

A vervet in tree is safe from leopards but exposed to eagles; its alarm call can specify type of predator.

Getting no help, screamer gives a prolonged blink, a way to cut off social contact; challenger turns away.

The threatened monkey keeps screeching as challenger leaves. Entire sequence lasted only about two seconds.

younger Nikkie. For several months the two males harassed each other. Luit thumped the ground in confident threat while Nikkie hooted and threw stones. One day Luit, with the help of two females, drove Nikkie up a tree. Nikkie began to hoot again, while Luit sat at the base of the tree with his back to his challenger. As Nikkie hooted, the dominant male's lips pulled back, baring his teeth in the telltale grimace of chimpanzee fear. Luit then put his hand over his own mouth and pressed it closed. Frans de Waal reports: "I could not believe my eyes and quickly focused my binoculars on him. I saw the nervous grin appear on his face again and once more he used his fingers to press his lips together. The third time Luit finally succeeded in wiping the grin off his face; only then did he turn round. A little later he displayed at Nikkie as if nothing had happened. . . ."

The little-known pygmy chimpanzees seem to many observers even more subtle than the "common" chimp. Pygmy chimpanzees live only in an inaccessible region south of the Zaire River; no more than 50 or so are in captivity. These ambassadors for their species reveal to scientists like Jeremy Dahl and Steven Runfeldt at Yerkes that the dynamics of their social life rarely work by overt threat, but rather by sex, friendship, play—and perhaps even by the foreseeing of others' behavior.

What if ape lies to ape?

Several of the psychologists who have taught sign language to apes have reported actual lying. When confronted with a pile of feces on the carpet, or a cast-iron sink ripped from the wall, the delinquent apes claim "So-and-so did it," blaming a human companion. This is just the sort of account which makes other psychologists retreat to the safer world of stimulus-response, with mutterings about the mush-mindedness of anyone who would foster-parent an ape in the first place.

But what if ape lies to ape? Matata is a female pygmy chimp who had been participating in another Yerkes project, the language-learning research of Sue Savage-Rumbaugh. Matata partially learned only half a dozen symbols, which is not surprising in an adult female caught in the wild, already fairly set in her ways. She returned to the social group for breeding and found herself subordinate to Lorel, a female she had easily dominated in earlier years. The situation lasted for some days, until Matata happened to be alone in the outer cage with Lorel and the child of a still more dominant female. Matata reached up and yanked on the child's leg, where it dangled on the net above her. The little chimp squealed, of course. All the other animals came pounding out of the inside cage, including the adult male and the child's bristling mother. As they emerged Matata glared at Lorel and barked. The dominant mother swung round and attacked innocent Lorel. From that day on, Matata again lorded it over Lorel, whenever there was food to take or babies to groom.

It is all too easy to give such a tale a wholly human interpretation. It is not clear, and will not become clear, whether Matata saw one step ahead, or two

Jane Goodall, © National Geographic Society

steps, or none. Sentimentality will not give us an answer—it will come only from the accumulation and critical scrutiny of similar evidence.

That evidence may now be collected and openly discussed, thanks in no small part to Donald Griffin. Admittedly, this approach is still so unfashionable that younger, less eminent people would risk their careers by raising such questions. Among the reactions to *Animal Thinking* have been widely favorable reviews and few sharp rebuttals, but, as Griffin remarks, "I am protected by what I call a politeness curtain—or perhaps my critics are afraid I'll get their grants to review!" More seriously, he says that his reason for writing the book was not simply to stir up the scientific hive: "Beyond the desirable effect of stimulating behavioral scientists to conduct investigations they might not otherwise tackle, I really do think there may be such a thing as animal consciousness."

Figan, whose deceptive acts as a youth were first seen by Jane Goodall, now enjoys life as dominant male.

Mon.

Tue.

Thur.

Fri.

Photograph by Robert Phillips

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Wed.

Sat.

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NEWSWEEK 1985

The week we had to write in a day.

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The Marine massacre in Beirut was one of those weeks.

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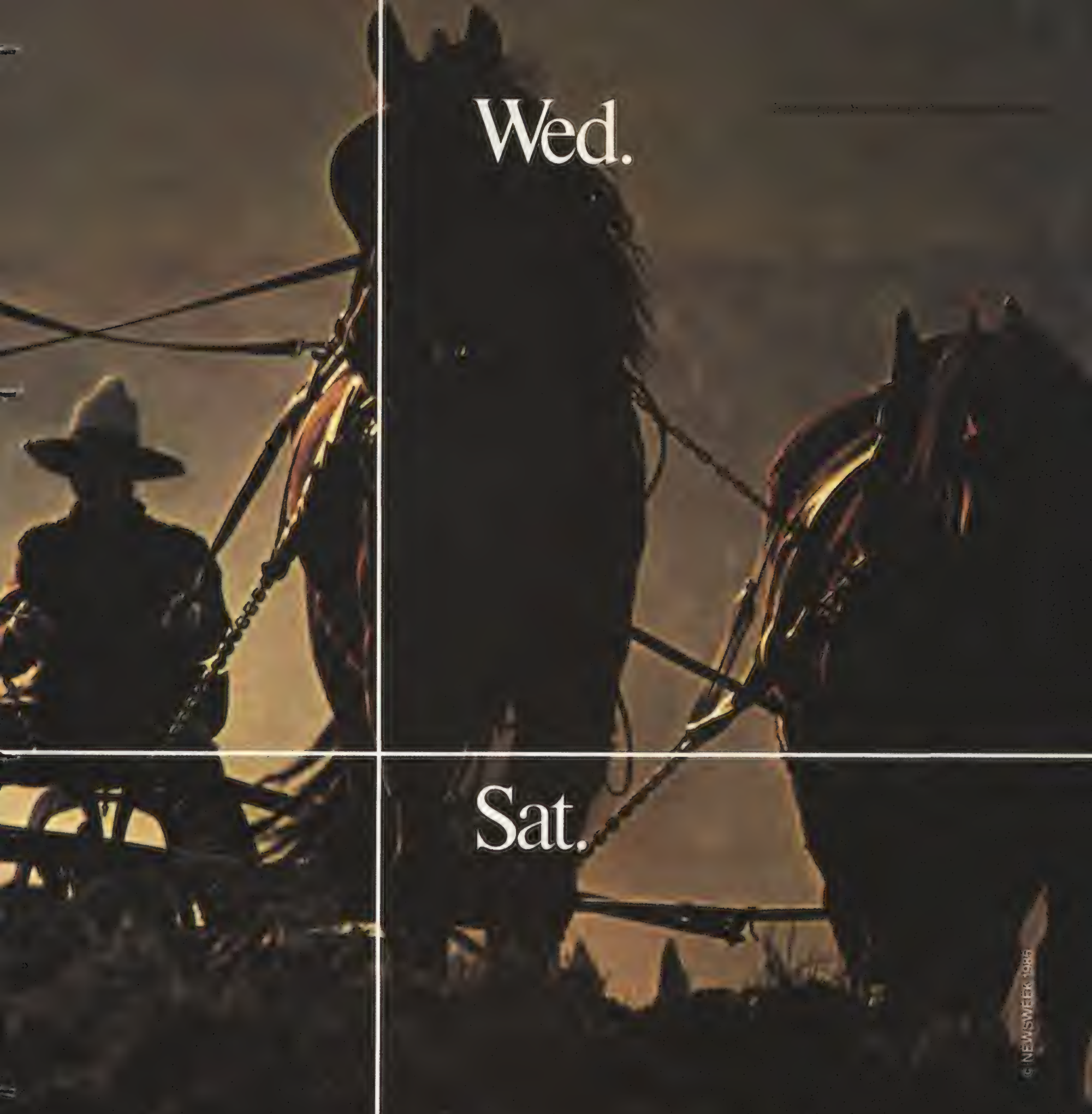

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Richard III

Henry VI

Edward, his son

Somerset

Buckingham

Hastings

Vaughan

Clarence

Grey

Queen Anne

King Edward V

Prince Richard

Rivers

By Robert Wernick

After 500 years, old Crookback can still kick up a fuss

Richard nervously fingers his ring in early portrait, but, true to life, is not shown here as a hunchback.

Partisans fight over King Richard III even today, but it is clear that he was not as deadly or deformed as his Tudor detractors claim

Richard has not been a name of good augury for kings of England.

Richard I, the Lionheart, was the only monarch in British history to show unusual talent both as a general and as a lyric poet. As a king, however, he was a cipher: he spent only a few months in his country, he bled it dry to pay his way out of an Austrian prison, and he died of an arrow in his shoulder during a petty squabble with one of his French vassals.

Richard II was considered a mollycoddle by his nobles because he favored peace with France and introduced the use of the handkerchief into England. They deposed him and murdered him.

As for Richard III, everyone knows him from Shakespeare, the most durable villain that ever walked the English stage, "misshapen Dick . . . valiant crook-back prodigy . . .unlick'd bear-whelp . . . indigested and deformed lump . . . bottled spider . . . poisonous bunch-back'd toad . . . lump of foul deformity . . . elvish-mark'd, abortive, rooting hog!" In the course of a few bloody acts, Shakespeare's Richard kills the Duke of Somerset at the first Battle of St. Albans (when, by strictly historical reckoning, Richard was two years old); stabs the Prince of Wales after the Battle of Tewkesbury; murders poor saintly King Henry VI in the Tower of London; lures his brother Clarence to a messy death in 126 gallons of Malmsey wine; cynically woos and marries the widow of the murdered Prince of Wales and subsequently poisons her; beheads Lord Rivers; beheads Lord Hastings; usurps the throne from his little nephew Edward V; murders Edward and his brother the Duke of York in the Tower; beheads the Duke of Buckingham. The whirling circle of his crimes is stopped only when (500 years ago this August) he is slain on Bosworth Field by the righteous Henry Tudor, who becomes Henry VII, founder of a new and happier line of monarchs.

Richard's victims, according to Shakespeare, included two kings, a queen and assorted threatening nobles.

The venom of Shakespeare's portrait comes from Sir Thomas More, his principal source, who would have had easy access to many eyewitnesses of the events he describes. He was also a man of high principles, devoted to the truth, who died a martyr rather than kowtow to his temporal master, Henry VIII.

However, More's history is full of demonstrable

errors of fact—his very first sentence gets the age of Edward IV at his death wrong by more than ten years—and some sources of his information were interested parties like Cardinal Morton, the chief plotter of Richard's overthrow.

The Tudor dynasty established by Henry VII had only the shakiest claim to legitimacy and lived in constant terror of revolt. To justify its own seizure of power, it had to portray Richard as a monster, and Tudor historians therefore were of necessity Tudor propagandists. Look at John Rous, a priest and antiquarian. He wrote a life of Richard during his lifetime, making him "mighty prince and especially good lord." But after Richard's death he took it back and makes the life a series of horrors from before birth. Rous reports that Richard spent two whole years in his mother's womb and came out with a full set of teeth. Shakespeare continues the slander: "That dog, that had his teeth before his eyes/ To worry lambs and lap their gentle blood."

History is always written by the victors. The basic Tudor picture of Richard as a bloodthirsty tyrant was handed down through the standard histories of England and the school textbooks for five centuries. There has been an obstinate opposition, however. Beginning with Sir George Buck in the 17th century, a series of writers and historians have insisted that Richard was not getting a fair break, that the Tudor version was largely fabrication: far from being a monster Richard was a noble, upright, courageous, tenderhearted and most conscientious king. This anti-Tudor version reached its definitive statement in the work of Sir Clements Markham, a 19th-century eccentric who spent years of passionate research trying to prove that crimes attributed to Richard were either outright libels by, or the actual work of, a pack of villains, most notably including Cardinal Morton and Henry VII.

Letters from enthusiastic college kids

Markham provided the material for Josephine Tey when she came to write her famous mystery novel about Richard, *The Daughter of Time*, which was published in 1951. This book has been in print ever since, and has gone on stirring up emotions in all the English-speaking countries. "Not a year goes by," says William Hogarth, chairman of the Richard III Society in New York, "that I do not get letters from enthusiastic college kids who have just read Josephine Tey and want desperately to know what they can do to reestablish the reputation of that noble and most calumniated king." Some of these letters eventually grow into historical novels, like the recent 900-page *The Sunne in Splendour*, by Sharon Kay Penman.

The existence of a Richard III Society is in itself an

In dreadful Shakespearean scene, Richard tries to woo the widow of one victim at funeral of still another.

indication of how deeply feelings run after 500 years. Richard's reign of two years and two months was one of the shortest on record. His character was nowhere near so complex as that of other English monarchs like the psychopathic Henry VIII or the profligate Charles II. His death was dramatic, but as Shakespeare reminds us in *Richard II*, the chronicles of the past are full of sad stories of the death of kings: ". . . some slain in war,/ Some poisoned by their wives, some sleeping kill'd,/All murthered. . . ."

Yet it is Richard III who has a 3,000-member society named after him, working indefatigably to put up plaques and statues in his name and win a fair hearing for their hero everywhere. On Bosworth Day, August 22, the Richard III Society puts memorial notices in newspapers, though the *New York Times* now refuses to run them on the specious grounds that if it did it would have to run similar notices by mourners of Genghis Khan.

Members of the society, like Rex Stout, who had his detective Nero Wolfe throw his copy of Thomas More's *Utopia* out of his library in protest against More's shabby treatment of Richard, wear Richard's badge of the White Boar on their lapels and call themselves Ricardians. Those on the other side they call antiRichards (like Antichrists). Ricardians have made considerable strides in recent years, and the patron of the Richard III Society in London is now a member

After spurning him, the lady, Anne Neville, finally becomes Richard's wife and winds up being poisoned.

of that Royal family which usurped Richard's crown at Bosworth. He is Richard, Duke of Gloucester (the first time in 500 years that this fateful conjunction of names has been allowed to reappear), and he stands not much further from accession to the throne than his namesake did in 1471. But he is an eminently respectable duke, his back is straight as a ramrod, and no princes are expected to die in the Tower in his lifetime.

The antiRichards have not been disarmed, for all that. Nineteen eighty-three, the year that saw the publication of Jeremy Potter's *Good King Richard?* (the question mark is quite superfluous), also saw the publication of *Richard III, England's Black Legend* by Desmond Seward, who not only accepts everything that More and Shakespeare said, but goes them one better by saddling Richard with the murder of the Bastard of Fauconberg, which few others have done before. In 1983, too, we had *The Year of Three Kings*, by Giles St. Aubyn, who maintains it is "only necessary to tell the truth to blacken Richard's name."

Ricardians and antiRichards have come to blows in the past over a whole series of burning questions. Was Lord Hastings' head chopped off on the 13th or 20th of May? (The date had great bearing on the question of whether Richard had planned to usurp the throne long in advance; though what the bearing is is uncertain, since foes and friends of Richard have both used both dates to support their interpretations.) Would Queen Elizabeth Woodville have let daughters out of sanctuary if she had thought Richard had murdered her sons? (If you think so, you don't understand a mother's heart, say the Ricardians. If you don't think so, you don't understand the mind of a vain designing woman, say the antiRichards.) Were the bones found in a chest under a stairway in the Tower late in the 17th century those of the two missing princes? (Scientific tests, say some, have proved they were. The tests, say others, were not scientific enough, and really prove nothing except that the bones were prepubertal. Since architectural evidence proves only that they were pre-1684, they might have been the bones of a pair of Roman girls.)

In the smoke and din of controversy, it is hard to keep a neutral stance. Old tales of murky treason and royal murder are fertile breeding grounds for passionate controversy. All the more so because in this case there is very little solid information; the imagination is free to rearrange and interpret, any way it pleases, the few bare facts that have come down from contemporary sources.

One of the few things that seem reasonably certain about Richard is that he was not deformed. The hunchback, the withered arm, the malignant face, the twisted dwarfish body were all inventions of Tudor propagandists. The only contemporary reference to anything odd about his appearance was one statement that his right shoulder was higher than his left. Perhaps, it has been conjectured, the perpetual thrusting and slashing which a young man of the 15th century had to do to keep in shape for battle caused the muscles of his right arm and torso to look swollen on his slight frame. The Countess of Desmond told friends at the court of Queen Elizabeth I that she had danced with Richard when she was a young girl and "he was the handsomest man in the room, except his brother," but as she would have had to be well over a hundred years old if this story were true, perhaps her memory was faulty.

Richard was said to be short and dark, like his father, quite unlike his great blond brother, King Edward. The surviving portraits show a firm, bony, reasonably handsome face, full of intensity and a sense of uneasiness. In most of the portraits he is toying with a ring on one of his fingers, and the Tudor historian Polydore Vergil says he was always biting his lower lip and pulling his dagger halfway out of its scabbard and pushing it back. (There is a rich field for amateur psychoanalysis here, but happily none of Richard's biographers has cared to plow it.)

Robert Wernick has recently written about pepper and its link with exploration, and the exploits of Eugene of Savoy (January 1985).

Big brother, Edward IV, died from overindulgence, touching off a bloody struggle for succession.

The uneasy look can be ascribed, by those with an antiRichard prejudice, to a bad conscience. Equally, it can be ascribed to the fact that he lived in disquieting times, when no man could be sure what ax was being sharpened to cut off his head. Richard, like anyone else, has to be measured by the standards of his time and place. As Horace Walpole, one of his early defenders, said, "It is shocking to eat our enemies; but it is not so shocking in an Iroquois as it would be in the King of Prussia."

Richard came to manhood in the bloody anarchic times known as the Wars of the Roses, though they were not so much wars as gangster brawls. Nor were they, strictly speaking, of the Roses. The Red Rose of Lancaster, an invention of his successor Henry VII, was meant to symbolize the reunification of England when he married Richard's niece Elizabeth of York. His Lancastrian predecessors generally fought under the banner of the White Swan of Bohun. The Yorkists sometimes used the White Rose as their symbol, but Edward IV preferred his own device, the Sun in Splendor, while Richard used the White Boar.

The battles in these wars called for no great tactical skill. Generally the two armies (a few hundred or at most a few thousand men on each side) would fire their arrows and their newfangled cannon at each other. When they ran out of projectiles they would come together and hack at each other with sword, bill or battle-ax till the leaders on one side or the other were killed or captured. Noblemen taken prisoner would be beheaded as traitors and their lands declared forfeit, to be divided by the victor among those he expected to support him in his next battle.

All these wars were fought with a very materialistic passion for land, which was almost the sole source of money and power in those days. Land revenue had fallen when the Black Death carried off one-third the laboring population, and to keep their power and reputation, noblemen had a desperate need for more and more real estate. To get it, a lord would sell his sword and those of his retainers to the rival kings of York and Lancaster, he would fight for them or betray them as he judged profitable, and in between dynastic battles he would plunder his neighbors' manor houses, kidnap heiresses, forge wills, take bribes from the king of France. Life expectancy was low under these conditions, and the chronicles of these times are largely concerned with the bloody squabbling of headstrong boys. It was noted of Edward, the Lancastrian Prince of Wales in 1467, that he would talk of nothing but "cutting off heads or making war." He lost his own life, at age 18, at the Battle of Tewkesbury four years later. By the time this battle was over, the royal blood of England had run so thin that the Lancastrians had to go far afield to find a claimant to the throne: Henry Tudor's claim was derived from his great-grandmother, a daughter born out of wedlock to John of Gaunt, third surviving son of Edward III.

These rapacious youths had their gentler side. They loved music, they collected illuminated manuscripts, they were often fervently religious, they devoured tales of chivalry like Thomas Malory's *Le Morte d'Arthur*, first printed during the reign of Richard III, and eventually to provide John F. Kennedy with his idea of Camelot. They saw no contradiction between knightly dreams and the sordid realities of their intrigues and killings, any more than they minded the fact that Malory spent a good part of his life in prison for armed robbery and rape.

Overshadowed by a blond giant

Richard of Gloucester, brought up in this world, was not originally intended to play the role of king. He spent most of his first 30 years in the shadow of his brilliant older brother King Edward IV, the handsome giant who never lost a battle or met a woman he could not seduce. Richard was at Edward's side through exile, poverty, triumph and riches, always true to his motto, *Loyaulte me lie* (Loyalty binds me, the

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Little nephews, Prince Richard and King Edward V, conveniently disappeared after Uncle took the crown.

motto of Ricardians to this day). Edward repaid him by showering him with confiscated estates, honors and titles: Duke of Gloucester, Admiral of England, Ireland and Aquitaine, Constable of England, Chief Justice of North Wales, Warden of the West Marches. At the age of 19 he was given the rule of the whole north of England, and for ten years he fought successfully against the Scots and won the devotion of the local population for his good administration and evenhanded justice. He was just 30 when the news came up from London that King Edward was dead suddenly, age 40—of a surfeit, presumably, of food, drink and sex—and the realm of England was in crisis.

It was a crisis of Edward's own making. In the days when he was first king, and a hot-blooded boy of 20, he was smitten with the charms, the heavy-lidded eyes and the long golden tresses of a penniless young widow, Lady Elizabeth Grey, née Woodville, and after she vowed to stab herself rather than submit to unchaste advances, he married her. Though she was descended on her mother's side from the Emperor Charlemagne and from the fairy Mélusine, ancestress of the Lusignan kings of Cyprus (as well as the most beautiful woman of her time, though she turned into a snake below the waist on Saturdays), Lady Elizabeth was regarded as a vulgar upstart by the older nobility of England, and the misalliance helped provoke a revolt which almost cost the king throne and life. Edward went on sleeping with every woman in sight, but remained devoted to his queen and, more ominously, to her swarming, pushing family, the Woodvilles.

She had six sisters and five brothers. Edward was more than generous to them all. He gave them titles and manors and offices in the government. He arranged for them to marry into the oldest and proudest families. The nobles didn't like it, but had to do as they were told, even when the king told the Dowager Duchess of Norfolk, then pushing 80 and possessed of an immense fortune, to marry John Woodville who was not yet 20. Most important of the brood was the oldest brother, Anthony, Earl Rivers, a charming rake, scholar and mystic, the fanciest jouster of his time and translator of the first book printed in England. The Queen had arranged for him to be appointed Governor of the Prince, in charge of the education and upbringing of the child who would one day be Edward V, "whereby," says Thomas More, "her blood might . . . be rooted in the prince's favour."

Now old Edward was dead and young Edward, a child of 12, was King. The Woodvilles were ready to take over the whole government, the whole kingdom. Sir Edward Woodville controlled the fleet. The Marquess of Dorset, the Queen's son by her first marriage, controlled the Royal treasure heaped up in the Tower of London. They sent urgent messages to Rivers telling him to bring the boy from his castle of Ludlow in the west straight to London to be crowned.

Beware the Woodvilles, warned Hastings

Other urgent messages were being sent at the same time from Lord Hastings, the late king's closest friend, to Richard of Gloucester in the north. Richard had been named by Edward IV to be Protector, ruler of the realm, till the young man came of age. But kings' last wishes were easy to set aside, and Hastings warned Richard that if the Woodvilles got the young king crowned they would take over everything, and it would be all up with the Duke of Gloucester—and Lord Hastings. Everyone remembered that in the past century two Dukes of Gloucester had governed when their nephews came to the throne as boys, and both uncles were murdered.

Richard was a man of quick decisions. With a band of 600 men, he caught up with Rivers and the young king. He invited Rivers to a gay evening of feasting, then had him arrested and sent off to the north where in a few weeks he was beheaded. He told the 2,000 men accompanying the king to go home, and they unhesitatingly obeyed. Then he personally took charge of

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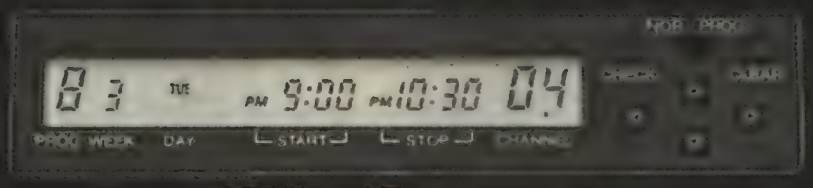

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his small nephew, who could do nothing more than burst into tears. This was on the 30th of April.

The little king and his Protector rode on into London where they were received with great enthusiasm. The Woodvilles scuttled in panic. Plans were drawn up for a lavish coronation for Edward. Then came a thunderclap of drama. Richard discovered (Ricardian version) that Lord Hastings, vexed at not getting the rewards he expected, was conspiring with the Woodvilles to get rid of the Protector; or he discovered (anti-Richard version) that faithful old Hastings would never condone a plot to usurp the Crown. At all events, on June 13 (or 20) Richard angrily accused Hastings of treason and had him beheaded without trial.

A week later Robert Stillington, Bishop of Bath and Wells (a stalwart old servitor of the Crown or a time-serving ecclesiastical bureaucrat, take your pick) came forward with what he said was a secret he had kept for 20 years: sometime before his marriage to Elizabeth Woodville, Edward IV had fallen in love with another noble lady, Eleanor Butler, daughter of the Earl of Shrewsbury, and he had gone through a ceremony of betrothal with her, a ceremony to which Bishop Stillington was the only witness. Eleanor Butler, quickly abandoned by her lover, was long since dead in a nunnery, but it made no difference. Under church law of the period, this "precontract" made Edward's marriage to Elizabeth invalid, and by an act of Parliament Edward V, henceforward known as Edward the Bastard, and his brother the Duke of York were barred from succession to the throne.

Richard of Gloucester was now the closest surviving legitimate male heir. On June 25 the Lords and Commons of England proclaimed him King Richard III.

The whole coup d'état had taken a bit more than two months. It all went so smoothly, it is no wonder that many contemporaries and most later historians have assumed that Richard had plotted it out in detail. But recent historians tend to see it as a series of hasty, often desperate improvisations in a rapidly changing situation fraught with doubts and dangers. No one will ever know for sure.

Nor, in all probability, will anyone ever know for sure exactly what happened to King Edward V and his brother, whose sad fate was to exercise a spell over posterity. The two boys were lodged in the Tower of London, not primarily a prison then, but a combination palace, fortress, arsenal, treasury and zoo. They were seen playing and practicing archery on the grounds. They were seen staring out of windows. Then they were seen less and less often, and after about the month of August they were not seen at all.

According to Tudor historians, Richard had them strangled in their beds by one of his henchmen, Sir James Tyrell. But they also record rumors that one or both of them were smuggled out of the country to Flanders. In the reign of Henry VII a young Flemish lad named Perkin Warbeck convinced many people, including his aunt, the Duchess of Burgundy, and half the courts of Europe that he was the Duke of York who had been imprisoned in the Tower. He invaded England, and was almost successful; if he had been, he would presumably have reigned happily as Richard the Fourth, with his subjects perfectly content.

For what subjects wanted of their kings in 15th-century England was not an impeccable pedigree or a virtuous character. They wanted a strong ruler who could give them order and stability and spare them the horrors of civil wars like those of Lancaster and York. Richard may have done more harm to his cause and reputation by distributing land and offices too freely among friends from the north of England, offending southern landholders, than by having the princes put to silence.

Or more likely a blow in the head

Despite heroically ingenious efforts to place the blame for the murders of the princes on the Duke of Buckingham, or the Duke of Norfolk, or King Henry VII, there seems little doubt that Richard himself was responsible, as some members of the Richard III Society will admit when they know no one is eavesdropping. In medieval England deposed kings (even babyish and uncrowned) were as good as dead. Edward II was killed on the orders of his wife Isabelle, the she-wolf of France, and her lover Roger Mortimer. Richard II was either butchered or left to die of starvation on the orders of the usurper Henry IV. Henry VI died in the Tower, "of pure displeasure and melancholy" says one Yorkist account, but more likely of a blow in the head, ordered by his jovial cousin Edward IV.

Gloomiest Richard (Olivier, 1956) was a brooding tyrant.

Cutest Richard was played in Boston in 1853 by Ellen Bateman at age 9.

Vilest Richard (Rathbone in 1939 film) was "too bad to be true."

Long-running Richard, 18th-century acting genius David Garrick starred in the role for 35 years.

Current Richard, Royal Shakespeare's Antony Sher offers "orthopedically correct" version.

Old Vic Richard in 1957, Sadler's Wells Ballet's Robert Helpmann emphasized the king's deformity.

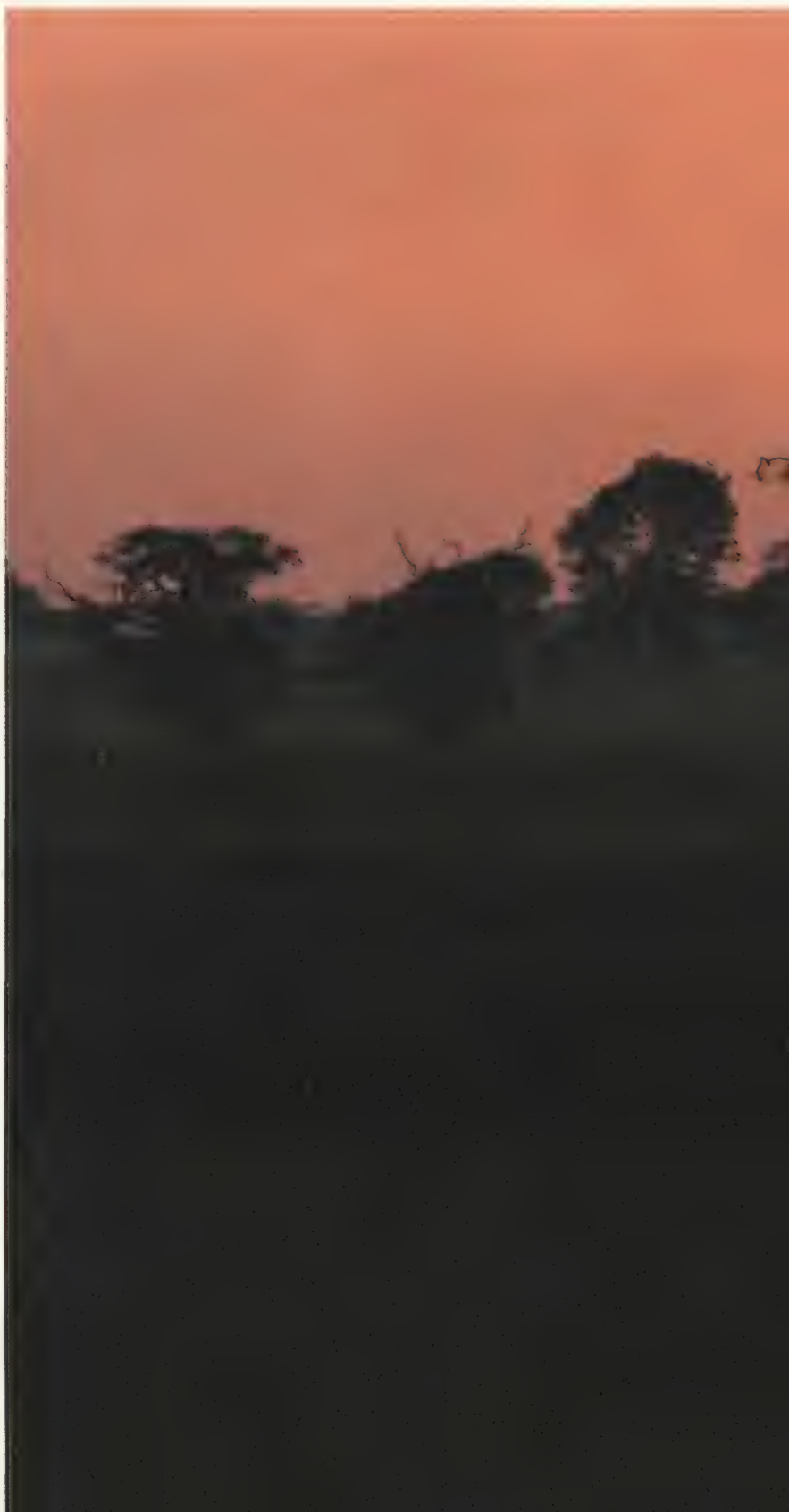
All these murders were done in the dark, murkily, and though there must have been plenty of witnesses, few or none came forward to give evidence. It was better for ordinary folk to turn away their eyes on such occasions, since "these matters be Kings' games," in the words of Thomas More, "as it were stage plays, and for the most part played upon scaffolds. And they that wise be would meddle no further."

So there was no public outcry over the death of the princes, any more than there was to be when Henry VII chopped off the head of the young Earl of Warwick, or when Henry VIII chopped off the heads of the blameless old lady, the Countess of Salisbury, as well as the Earl of Suffolk, the Duke of Buckingham and the Marquess of Exeter, solely because they had better claims to the throne than the two Henrys.

There was no popular uprising against Richard when Henry Tudor, at best a remote Lancastrian pretender, invaded England. He had been exiled in France for 14 years. But he saw his chance to supplant Richard, and quickly raising an army of French mercenaries, he borrowed a fleet from the French king, landed in Wales and marched to Bosworth. Even so, Richard was killed in the fighting only because Sir William Stanley, who had been waiting on the sidelines with his private army of 3,000 men to see which way the wind was blowing, decided at the last minute to come in on Henry's side. (Little good it did him. His head was cut off ten years later.)

Richard reigned too short a time for judgments on his merits as king. Defenders point to his zeal for justice, the progressive acts that were passed by his only Parliament, his encouragement of the arts, his anachronistic tendencies toward mercy (if only he had cut off

Henry VII, after defeating Richard III in battle, went on to establish the long and stable Tudor dynasty.



Sunset on gory reign of the ambitious son of York took place here, at Bosworth Field in Leicestershire.

a few more heads, they say, notably those of the Countess of Richmond and the Bishop of Ely, he might have died in bed). Enemies point to fearful errors in judgment, financial carelessness, reckless diplomacy.

He certainly lacked one of the prime requisites of a successful king, which is luck. If his agents had been an hour earlier they would have caught Henry Tudor escaping from Brittany into France, and there would have been no invasion and no Tudor dynasty. At Bosworth he gambled everything on one bold cavalry charge. He unhorsed Sir John Cheyney, the biggest knight in England. He killed Henry's standard-bearer. If he had struck right instead of left, he might have killed Henry himself and won the battle at a stroke.

It may be that his bad luck followed him till his very last moments on Earth. According to a recent theory, when Stanley ordered the charge, he did not mean to betray Richard, he meant to betray Henry. But on the dusty battlefield Stanley's soldiers went for the wrong man. And though Richard swung his battle-ax like a madman, shouting "Treason! Treason! Treason!" they bore him down by weight of numbers and killed him, the last English king to die in battle.

The new king paid the niggardly sum of ten pounds, one shilling for Richard's coffin, which is said to have been dug up later and used as a horse trough. The bones were thrown into the river Soar.

"Darkened and dishonored" was his name, and so it was to remain for centuries. But today if you visit Bosworth, up on Ambion Hill where Richard looked down on his enemies on the dawn of the fateful day, you can see the battle standard of the White Boar fluttering in the wind to rally the Ricardians of the world in their campaign against 500 years of calumny.

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Soon olive pickers will clamber aloft. Harvesting and processing fruit as soon as it is ripe yields best oil.

By Dora Jane Hamblin

To Italy, olive oil is green gold—and is as essential as *vino*

An alimentary staple and gustatory delight around the Mediterranean for millennia is now more popular than ever in this country

Spread out beneath venerable olive trees in this ancient grove in Apulia, nets await the fall harvest.

Pitter-patter is the soft, evocative sound of spring for much of the world, but where I live it is the gentle music of fulfillment, of season's end: the sound of olives landing with little plops on sheets of plastic or fine netting laid out on the ground under the gnarled evergreen trees.

It would sound exactly like rain if it weren't for the voices. But there are always voices up in the trees—loud, bantering, happy—for olive-picking time is joyful in Italy. It marks the end of the year's hard work for the *contadino*, a reliable cash flow for the bigger operator, and the prospect soon of dipping chunks of

Count Onofrio Spagnoletti Zeuli samples 1984 vintage fresh from press. His oil is of top quality.

garlic-flavored bread or toast into the new green-gold oil to savor one of nature's greatest gifts to Man.

Perhaps not every American savors that particular treat, but in the past four or five years olive oil has become one of the hottest items on U.S. gourmets' shelves, prized for its rich flavor, its purity, its lack of greasiness. The only edible oil made from a fruit instead of a nut or seed (i.e., corn, peanut, safflower, sesame), the finest olive oil requires no treatment other than simple pressing. No chemical manipulation, no solvents, no additives. Dietitians find it to be among the most digestible oils, assimilable at any age, the most resistant to alteration at high temperatures, and thus excellent for cooking. Scientists have touted its qualities for years, notably Ancel Keys, late of the University of Minnesota and something of a guru in Italy because of his studies of the different diets of Europe, Japan and the United States. Fifteen years ago he announced that the "diet of the poor"—light on meat and grease, heavy on vegetables, fruit and olive oil—seemed to reduce the incidence of coronary heart diseases. He has been repeating this ever since, and has been joined by other experts here and abroad.

Each such pronouncement elicits smiles of satisfaction around the rim of the Mediterranean, where 95 percent of the world's olives are grown. And just a

Photographs by David Lees

Olive oil tickles U.S. palates

Traditional harvesting, by combing or whacking fruit from branches, gives workers a chance to socialize.

Mechanical harvester, now used in a few large groves, grasps trunk and shakes the olives from tree.

touch of condescension, too, for in these parts people have prized olive oil for centuries—no, millennia.

"Plato and Aristotle, Phidias and Praxiteles, Scipio of Africa, Caesar, Christ and the Apostles all flavored their food with olive oil," proclaims Sabato Visco, president of the Italian National Institute of Nutrition. So, he burbles on, did "Dante Alighieri and Lorenzo the Magnificent, Pigafetta and Columbus, Galileo and Malpighi . . . and after untold thousands of years Mediterranean people show no signs of degenerative phenomena. . . ."

Just where the olive originated nobody knows for sure. Archaeologists have identified its presence on Crete by 3000 B.C. and in Egypt by 1000 B.C. By then it had appeared in Palestine and later was taken by Phoenicians to Carthage, Libya, Greece. Greeks transported it to Spain, to Sicily and southern Italy, and in late Roman times it arrived in Sardinia and southern France. Along the way it acquired a mystic symbolism: it was an olive leaf which the dove brought back to Noah's Ark to mark the subsidence of the great flood. In Greece it was sacred to Pallas Athena, an allusion to the legend that in winning the contest for the city of Athens the goddess had presented it with an olive branch. A crown of olives was the highest distinction

Although machine saves considerable time and labor, some varieties of tree react badly to such treatment.

Plump and glistening, these just-harvested olives are ready for the next stages: cleaning and pressing.

presented to a Greek citizen who deserved well of his country, and the prize to a winner in the Olympic games. Romans anointed their kings with it, and forbade burning of its wood for "profane" purposes: olive wood was for altars of the gods. To hold out an olive branch symbolized overtures for peace.

As the centuries passed and the legends grew, the wild olive was domesticated and grafting produced dozens of different strains in response to climate and soil differences. (The 15 major oil-producing areas of Italy alone have almost 60 different types of olive tree.) But the gnarled gray trunk, the skittery leaves green on top and gray underneath, remained basically the same. The tree itself, as indestructible as a geranium and capable of centuries of fruitful life, became an integral part of the Mediterranean landscape.

Just as durable has been the method of picking and processing. Until recently nobody had invented a machine that could effectively harvest olives, and if they were left until they fell from sheer exhaustion or old age, the oil wasn't as good. Now some entrepreneurs are using U.S.-made nut-harvesting machines which can grasp and shake the trees, and some pickers whack at them with long canes, although many types of tree respond badly to being shaken, and whacking can damage the tender branches. So most olives in Italy are literally combed from the branches with wooden (or, nowadays, plastic) combing tools, as they have been for centuries—wriggling bodies up in the branches, or balanced on ladders, snatching limbs with one hand and combing with the other. Half a day of this can leave a novice feeling as if he had been run over by a truck, but experienced hands insist they actually enjoy the climbing and balancing, the long hours of conversation with fellow pickers.

Carefully lifted up in the nets or plastic, the olives are poured into baskets or crates, picked over to clean out leaves, bits of twig, any other extraneous matter, and hauled off to the *frantoio*, the crusher. Only big growers operate their own presses; most use the cooperative or commercial small presses in the nearest village. Step one, crushing, has changed only in its power source: work done a century ago by mules or donkeys, 50 years ago by steam engines, is now accomplished by electricity that turns giant granite millstones inside the vat into which olives are dumped. A ripe olive, minus the pit, is 20 to 30 percent pure oil. Within the crusher the whole mass is crunched into an ugly-looking paste which workmen put onto circular woven mats of rush, grass or hemp. The mats and their gooey load are put into the press itself, where the paste is squeezed until all the liquid has seeped out and the crushed pits remain in the matting. The liquid then goes into a centrifuge. Out of one spout gurgles a muddy-looking water workmen call *inferno*, or hell, and out of another glides the golden or greenish-gold oil itself. It is from this first pressing that the finest oil

The author, a frequent contributor, follows her own olives to her village frantoio, *where the press runs night and day and sightseers are welcome.*

comes. It requires no further treatment whatsoever.

What many a would-be connoisseur doesn't know, however, is that really fine oil is rated, by Italian law, on its degree of acidity and graded on "virginity." *Extravergine*, extra virgin, is the best, with a degree of acidity not exceeding one percent. Next come superfine virgin, up to 1.5 percent; fine virgin, up to 3 percent; and simple virgin, to 4 percent. Oils without a virginity ticket, sold in the United States as "pure olive oil" or simply "olive oil," may have nutritive value equal to the virgins, but they are a blend of virgin and refined oils.

If not refined, these oils are classified as *lampante*, an ancient term meaning suitable for an oil lamp but never, never on the salad or in the soup. Lesser oils can of course be used for other things—in the textile industry for wool combing, in cosmetics, in soap, as a lubricant. It's still olive oil, but the fine delicate odor and flavor—Italians describe it as *ardente*, ardent or passionate—of the virgins has vanished.

No grower-picker worth his pasta would send his olives off untended. He goes along to oversee the pressing, chat with the workmen and follow his very own olives from crusher to demijohn, to be carried lovingly home. Often the village *frantoio* works 24 hours a day in high season, because when one man's olives are ripe so are his neighbors', and the quality of oil can suffer in a long delay between tree and press. Once stored carefully away from heat, strong light and odors, olive oil stays good for a couple of years. Expert tasters say that it tends to lose its "bite," the tangy olive taste, after a year or so and acquires a slightly nutty or sweet flavor. It rarely lasts that long in Italy, where the per capita consumption is ten liters a year.

Even as this year's crop plunks into the nets and the ageless cycle repeats itself on thousands of farms, there are late 20th-century clouds on the horizon. Most relate to the European Economic Community, to which Italy was an original and enthusiastic adherent. But in the constant wrangling among members over agricultural planning and support, the EEC may cut payments to Italian olive growers, payments designed to subsidize growers and keep prices down. As if that weren't bad enough, the entry of Spain into the Com-

After cleaning, the olives are spread on the floor of open-air sheds to await their turn at the crusher.

Grandfather Spagnoletti's giant granite millstones are still in use, grinding the olives to a thick paste.

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Spread onto hemp mats, the paste is compressed to free the rich green-gold oil. Mat retains the pits.

As oil spews from centrifuge into a huge vat, some is diverted for traditional dunking with garlic toast.

munity, now being negotiated, could prove devastating. Spain is the only nation that produces more olive oil than Italy, and Italians fear its labor costs are lower. Further, the Spanish government has been encouraging growers to improve their stock and position themselves for entry into what will become an ever more competitive market.

Ironically, the people best able to meet the challenge are the large landholders whom a series of 20th-century Italian governments tried to divest of their holdings. One such is a now brother-and-sister *azienda* called Spagnoletti Zeuli at Andria near the Adriatic coast. Andria is in the region of Apulia, which has the largest acreage of olives in all Italy—930,000. Mile after mile of them cover the low-lying coastal plain as far as the eye can see, and have done so for centuries. The station of Rudae or Budae on the ancient Via Appia Traiana lay near Andria, and along the narrow twisting streets of the ancient cities in this province are traces of the Normans, the Swabians, Angevins, Spaniards and Bourbons, who contested with each other and the locals for possession of the land. Among the last "invaders" were the Spagnoletti Zeuli family, who arrived from Naples early in the 18th century.

"We don't know much about our ancestors, but because of the name Spagnoletti we think they must have come to Naples with the Spanish invaders," says Maria Alessandra Spagnoletti Zeuli. By 1730 they had acquired Andria's medieval ducal palace, and by the time the great-grandparents of Count Onofrio Spagnoletti Zeuli and his sister Maria Alessandra were running affairs, the family owned 10,000 hectares (almost 25,000 acres) on which they raised sheep, horses, olives, vineyards and grain. Those were the days of *mezzadria*, or share-cropping, when tenants lived on the land, performed all the work, and divided the crops and profits, usually 50-50, with the owner.

Today Contessa Maria Alessandra still lives in the ducal palace, and she and her brother run the business from there. They still sell wine and olive oil, as their ancestors did before them, from a vast storehouse full of barrels at a streetside entrance at the rear of the palace. Andrians, neighbors and friends from as far away as Milan and Naples come with their containers.

Apart from that, almost everything has changed. Various land reforms have reduced the Spagnoletti

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Lugging their containers, local buyers wait at *azienda*. Countess Maria Spagnoletti measures out their oil.

holdings to around a thousand acres, 65 percent of it in olives. The *mezzadria* system has ended, and now the pickers live in town, go to work in car-pool trucks and make a flat daily wage negotiated with unions. Women no longer help pick here, as they do on small family farms, and young men vie for jobs as olive-picking machine operators or tractor drivers because these are skills which can be used between olive crops. Snaking through the lower branches of the Spagnoletti Zeuli groves is another innovation—drop-by-drop irrigation tubes fed by 800-foot-deep artesian wells, their pumps hooked to computers which turn them on and off as needed.

Here even one of the hoariest bits of Italian folklore is slowly fading: the proper *padre di famiglia*, peasant wisdom goes, is one who plants a vineyard for his sons and an olive grove for his grandsons—because for centuries an olive tree would not bear during its first 15 years, and then often only every other year. Once rooted and on its way, however, it was a dramatic survivor. If the central trunk was eaten by disease the tree would grow around it, leaving a hollow. If struck by lightning or sawed down for wood, it came up from the roots. It would cling stubbornly to rocky hillsides, survive buffeting winds and go on bearing.

On the Spagnoletti Zeuli acres are trees from which their great-grandparents harvested olives and, in the *frantoio*, five-foot-high millstones their grandparents used. But with careful selection of root stock (they plant now mostly an olive called *coratina*), with irrigation and cultivation, Count Onofrio has managed to get a crop from trees only three or four years old and to smooth out the cycle so the trees bear almost the same every year. His oil tests at .02 - .03 acidity, making it the most extra of *extravergine*, and the family sells part of it in bulk to dealers in Naples and to olive growers in Tuscany and Liguria in the northwest, who mix it with their own less abundant crop and bottle it under individual labels. In the process, the price to the consumer doubles.

In the fields two mechanical pickers work, each with a six- to nine-man crew. The daily harvest per man has more than tripled with this system. The machine shakes down 80 percent of the olives and the rest are knocked down with staves. On a good day a man can pick and load from 1,100 to 1,760 pounds.

In the *frantoio* the old millstones are turned by electricity, and a crew of six moves the olives into the crusher, onto the presses, into the centrifuge. Count Onofrio would like to modernize even further and install a conveyor system which would cut his *frantoio* force from six to two.

"It would save money to make us more competitive with Spain," he says. "And it would be good to speed up the whole process. The faster the olives move from tree to press, the better the oil. And the better the tree. We try to finish all our picking before January because an olive tree works very hard. It works nine or ten months of the year. If it must go on working, holding its olives until January, into February, it has no time to rest."

As competition increases, and if EEC subsidies decline, Count Onofrio and his sister believe that lower-grade oil and marginally productive groves will be the ultimate casualties. The Count, who in addition to his own *azienda* is president of the Olive Producers' Association of Bari, cautiously endorses another innovation in Italy: the use of DOC, a controlled denomination of origin, for olive oil. Up to now it is only a suggestion, but such a system has long been used as a guaranty of quality for fine wines: the product controlled and the label listing the name of the producer, the area from which it comes and the year of the harvest. Already some fine Tuscan olive oils are bottled and sold this way and have proved a success in the expanding U.S. market.

Many a grower and many producers' associations are vigorously opposed to DOC. To the not-so-secret joy of many a lover of the ancient Mediterranean landscape and the picturesque old ways, it will be a very long time before the system is used in the thousands of small groves scattered around the countryside. But in chic restaurants around the world, it may not be long before sophisticated diners will be heard to call, "Waiter, the oil list, please."

Bottled, tinned, decanted—it's all olive oil, a mere fraction of bounty available in U.S. food stores.

Kay Chernush

The van Zwanenberg Saga.

The Story of Stouffer's Search for an Aged, Natural Cheddar of Unique Flavor and Sharpness.

Along the southern tier of western New York, against the foothills of the Allegheny Mountains, dairymen create a smooth-textured cheese with a brisk sharpness. Rich and firm and yellow, this natural cheese is aged for almost a year until its cheddary goodness snaps with flavor.

It's the limestone. The proximity of the Great Lakes and the high limestone content of the soil make this particular cheddar unique. Cows consume grass and water that creates milk that makes up into a cheese with very special qualities for curing and an unusual characteristic flavor.

A hundred-year-old tradition. In the 1890s, dozens of little cheese companies prospered around the town of Cuba, New York. Seventy-pound rounds of cheddar filled the cool, stone cellars of village stores where curing conditions were ideal. A nearby lake and ice-house provided the only refrigeration system needed in the summer months to dependably maintain 37° to 42° temperatures.

The Dutch touch. Around 1935, I. van Zwanenberg, a Dutch immigrant and provisions merchant, organized the dairymen and cheese makers from the region into a cooperative. They established consistent standards and procedures for making New York State Cheddar that endure today, followed to the letter by second and third generation van Zwanenbergs.

Stouffer's own homemade sauces. New York State Cheddar that's aged for almost a year develops a special texture and richness that's absolutely necessary in the creation of Stouffer's® own homemade cheese sauces. No less than eight of our entrees and side dishes are made with these rich, flavorful sauces. They are Macaroni and Cheese, Chicken Divan, Potatoes au Gratin, Welsh Rarebit, Cheese Soufflé, Chicken Stuffed Shells, Broccoli with Cheddar Cheese Sauce and Spinach Crepes with Cheddar Cheese Sauce. Of course, grated cheddar, melted and browned on some of our baked entrees, also contributes to that special Stouffer's taste. Incidentally, none of our Lean Cuisine® entrees contain New York State Cheddar. Because, of course, the same qualities that make this such a superb eating cheese also make it too rich for people who watch their calories.

If you've followed this little story to its conclusion, you've come to understand **one** of the reasons why at least eight of Stouffer's Entrees and Side Dishes are as good as can be. It's because of the Cheddar Cheese that we use.

Stouffer's. As good as can be.

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Lent by Lady Juliet de Chair

Mares and Foals without a Background (1762) was commissioned by the second Marquess of Rockingham.

By Bennett Schiff

Stubbs' horses were all painted from inside out

Equally at home in the dissecting room, the stable, the racetrack and behind an easel, he was a very great English artist

Stubbs usually painted animals and figures first, added the background only if the patron required it.

Lent by Lady Juliet de Chair

This portrait study of Stubbs at the age of 53 was made by his friend Ozias Humphry in 1777.

There are some things in England, even now, that don't change. When the Queen recently took her first real vacation abroad in 17 years, giving precedence to pleasure over duty, she chose to come to the United States to spend her precious private time mainly looking at horses, the horse in a way being to England what apple pie is advertised to be to America.

Nothing could exemplify this more vividly than the grand showing, the largest and most detailed ever put together, of the work of an 18th-century commoner named George Stubbs, mounted at London's Tate Gallery and now splendidly installed through April 7 at the Yale Center for British Art in New Haven (made possible by United Technologies). The Tate is an elaborate palace on the Thames. The Yale Center is one of modernist Louis Kahn's purest essays in contemporary architecture (SMITHSONIAN, July 1979). The two could not be more different in style, but Stubbs shone in the one and now shines in the other.

His is work that would glow softly in any surroundings, it being its own source of light through the gentle incandescence of the color, but it is very much at home in regal settings, the greatest part of it having been commissioned by the top levels of the English aristocracy. In fact, next to Paul Mellon's, the British Royal Collection has more Stubbses today than any other—18. Mellon still owns 21 after giving the Yale Center no fewer than 16. The Tate itself possesses 12, two of which Mellon gave it along with 28 other sporting paintings. In all, there are now approximately 450 Stubbses of which the whereabouts are known, most of them spread around in what is left of the inhabited stately homes of England or in more modest accommodations, part of the family possessions.

In early 18th-century British painting the favorite subjects were people. English painting then was essen-

The Royal Collection, London

Stalwart *Soldiers of the 10th Light Dragoons,* with horse, were painted for the Prince of Wales. This regiment was the Prince's Own, and his commission to Stubbs was evidence of his pride.

tially English portraiture. The upper-class or aristocratic landed gentleman wanted *pictures* of his wife and children to hang in his manor house. Often enough he also wanted a portrait of himself, if only to hang alongside those of his illustrious ancestors, keeping up the tradition. English painting in that sense was not so much art as it was the acquisition of comforting emblems, medallions of a sort, representing familial intimacy or genealogical pride. Dr. Johnson summed it up, as he usually did with any subject he spoke on (although he was not at his best when it came to music or art), when he said, "I would rather see the portrait of a dog that I know, than all the allegorical paintings they can show me in the world."

For art, the wellborn seeker after knowledge and experience went elsewhere, on what was called the Grand Tour. Men of taste and sensibility—and money—brought back from France and Italy thousands of outstanding masterpieces which have become the universal artistic heritage and treasure of the country. The elegant literary man Horace Walpole wrote home from his own Grand Tour, saying: "I am far gone in medals, lamps, idols, prints, etc. and all the small commodities, to the purchase of which I can attain. I would buy the Colosseum if I could."

But at home it soon became evident that, if you were going to have portrayed your nearest and dearest, it followed that the next logical step was your horse. The Englishman began to be shown with his horse as well as his wife and children; in many cases, if you were to judge by whom he spent the greater part of his time with, you would have to conclude he preferred

Bennett Schiff is a member of SMITHSONIAN*'s Board of Editors. He recently wrote about an exhibit of Van Gogh's paintings from Arles (October 1984).*

Yale Center for British Art, Paul Mellon Collection

The Countess of Coningsby (c. 1760), here in Charlton Hunt livery, had her own racing stable.

The stately lady is followed by a little dog, whose self-importance is almost equal to her own.

his horse. Not all was ego, however. More often than not, he commissioned the growing number of painters who specialized in such subjects to paint just his horses and his dogs, preferably in the field. When the British sporting painter Benjamin Marshall (1768-1835) was asked why he went to work at Newmarket, then as now a great center for horse racing, he said: "I have good reason for going. I discover many a man who will pay me fifty guineas for painting his horse, who thinks ten guineas too much for painting his wife."

Of those artists who specialized in painting horses, George Stubbs is by far the greatest. Stubbs developed a visual language for displaying the tense suppleness and power of the animal which, because it is so exact and so compelling, no one has ever surpassed. And, if his exteriors are the most beautiful presentations of the lovely animal, his interiors—the anatomy of the horse—are works of such extraordinary accomplishment that they can be compared respectfully with Leonardo's anatomical studies. Stubbs' horses are literally painted from the inside out.

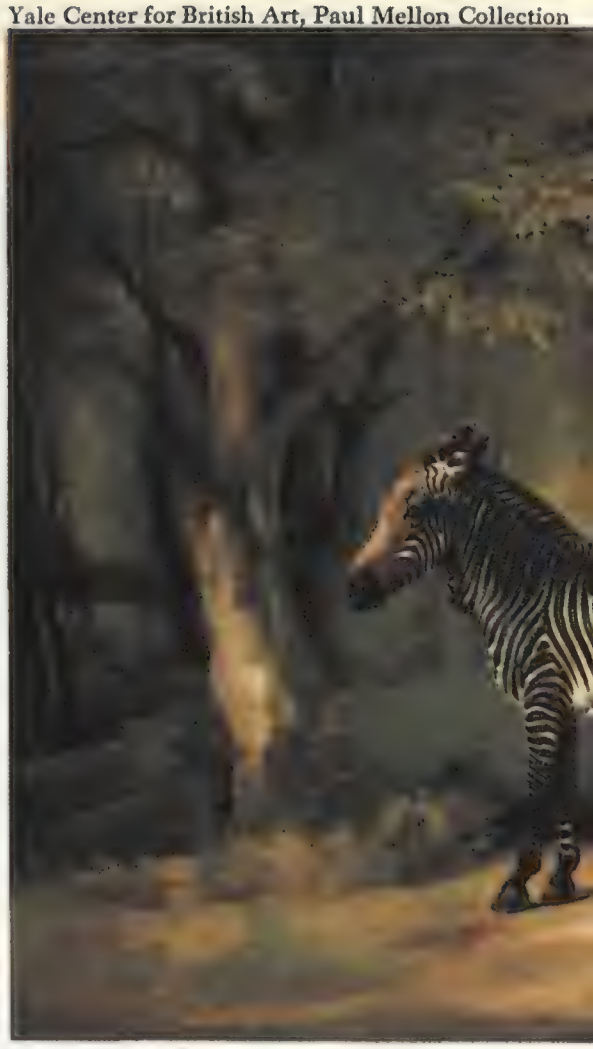
The horse was fundamental in the 18th century. You rode it for pleasure if you could afford to keep one, and it also got you from one place to another by public conveyance if you were poor. Before the advent of the steam engine it was the only means of traveling long distances on land. The horse also provided the muscle power needed for growing food. And horse racing, which reached manic heights in those years, was all of today's soccer and football and baseball rolled into one. For work and for pleasure, society depended on the horse. George Stubbs, you could say, was born to it, in Liverpool in 1724, his father being a successful currier and tanner.

Although Stubbs is one of the most straightforward, even-tempered, direct and clear-cut artists of any time,

Yale Center for British Art, Paul Mellon Collection

Horse Attacked by a Lion was commissioned by Lord Rockingham. "African" background is imaginary.

Yale Center for British Art, Paul Mellon Collection



Unlike the melodramatic lion pictures, *Zebra* is a sober,

there is something enigmatic about him. Now recognized to be one of the major artists of English history—along with Reynolds, Hogarth, Constable, Gainsborough and Turner—he has been given scant attention, often amounting to a mere mention, in the standard art histories. For more than a century he dropped out of the public eye entirely and was brought back to attention only about 25 years ago through the efforts of the English writers Geoffrey Grigson and Basil Taylor. Constance-Anne Parker published a revealing and readable book in 1971. Judy Egerton, formerly associated with Paul Mellon's British collections, now Assistant Keeper of the British Collection of the Tate, who brought together the present exhibition and who wrote the illuminating catalog, has also written elsewhere about his work with meticulous academic distinction and fine analysis. He is now back in the public eye where he belongs.

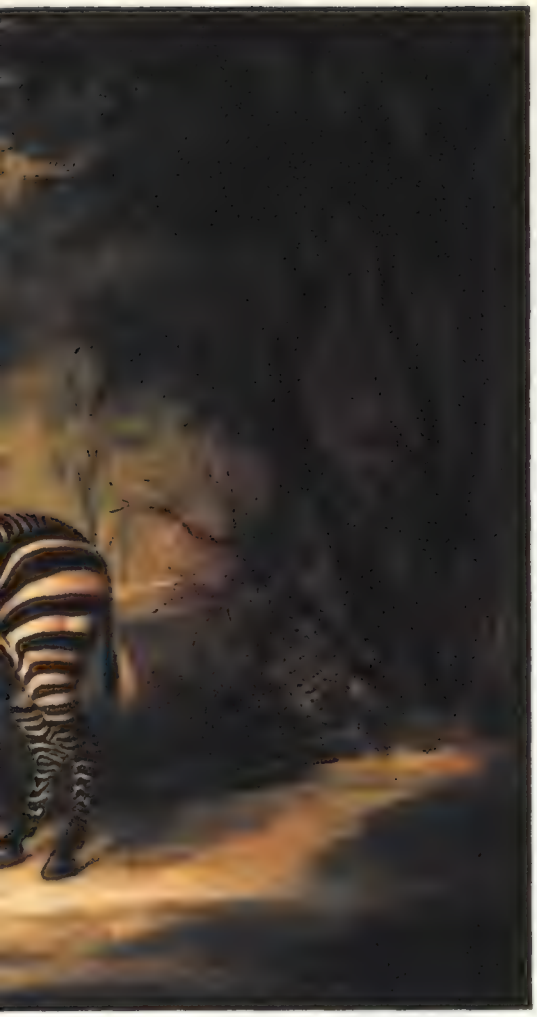
One great problem in learning more about Stubbs as a man is the paucity of contemporary material on him. There is not a single letter known that Stubbs himself wrote. All writers on Stubbs have had to go to a memoir manuscript of 98 pages written by Ozias Humphry, one of his artist friends, which is in the collection of the Liverpool City Libraries.

Until Stubbs was 15 he worked without any great enthusiasm as a clerk in the family business. There were six families named Stubbs listed in the Liverpool parish registers of the time and five of them were in the leather business. Horses. And yet it was as an itinerant painter that Stubbs began his professional career.

He was virtually self-taught. At the age of 16 he had attempted, following his late father's advice, to study with a local artist, Hamlet Winstanley, then copying paintings for the Earl of Derby, but disagreed about the subjects he was allowed to paint and left after a matter of weeks. From then on he was on his own. There is very little of his work that can be attributed to any outside influence: a trace here and there of Gainsborough technique in the background of his early horse paintings, perhaps some disposition of space and object gained from Poussin, but that is arguable—and that's about all. Even on a trip to Italy to see what the masters had to show, he was unimpressed. Proclaiming that nature was superior to art, he left Italy after only three months in Rome, a short stay for what was a very expensive and difficult journey in those days.

Before his trip to Italy Stubbs had worked as a portrait painter in York, where he also pursued studies in anatomy, took up French, attended a class in fencing and considered learning to dance, graces which gentlemen of the time were expected to acquire. In an extraordinary venture for an artist of those days, he illustrated *An Essay towards a Complete New System of Midwifery* by the well-known physician John Burton, doing dissections himself and drawing as he went along, at a time when anatomy was considered an

Philadelphia Museum of Art, the W. P. Wilstach Collection



accurate likeness of the first one ever brought to England.

Against elegant, silvery background, *Hound Coursing a Stag* is one of Stubbs' liveliest hunting scenes.

extremely suspect thing to do and getting subjects became a challenge to ingenuity. It was, after all, the age of notorious body snatchers who were suppliers to the medical profession.

In 1756, on his return from Italy, he found an isolated farmhouse at Horkstow in Lincolnshire and began work on one of the most remarkable publications of the century, his *Anatomy of the Horse*. You can be certain that it was more than quiet that Stubbs sought in that rural setting, far from any neighbors, when you consider what the dissection of so large an animal meant in noisome odors and noxious gases in those small rooms. Here, with only the help of Mary Spencer, his common-law wife for about 50 years, he carefully dissected, studied and drew with precise scientific accuracy and consummate draftsmanship the annotated plates of his great book (pp. 116-17). Then, he wrote the text. He labored there for 18 months, replacing the carcasses in turn as they rotted way. It was to be another ten years before the work, the plates masterfully engraved by himself, was published in London in 1766.

The book brought Stubbs great recognition. One of the leading anatomists and men of medical science in Europe, the distinguished Dutch surgeon Pieter Camper, wrote to Stubbs. "How is it possible," he exulted, "a single man can execute such a plan with so much accuracy and industry?" A year later he wrote again saying he was "amazed to meet in the same person so great an anatomist, so accurate a painter and so excellent an engraver. It is a pity you do not like to pursue the viscera of this useful animal."

The book had a very great effect, as Stubbs had intended it to, on painters of the time and those to come. Sir Alfred Munnings, a noted painter of horses of the following century, head of the Royal Academy of Arts, described it as "The most unique thing of its kind ever compiled. This heroic effort, an epic of the 18th century, is as great and unselfish a work as anything could be."

By that time Stubbs was firmly established in London, where he was to live for the rest of his life on a site now occupied by Selfridges department store, which faces on Oxford Street. A plaque in the store marks the approximate location of Stubbs' house.

Soon after he arrived in London to stay, in 1760, he became acquainted with Domenico Angelo Tremamondo, who had come from Italy, an exquisite practitioner of skills much in demand by the young bloods of the day. Tremamondo opened an establishment to teach *haute école*, the art of classical riding, and fencing. At this stylish school Stubbs, who probably went to observe the horses in action, met dukes, marquesses, earls and other nobility, all of whom gave him commissions. He had sold his first horse picture in London to Joshua Reynolds himself, a year younger than Stubbs but already well established as the leading portrait painter of the nation.

All: Royal Academy of Arts, London

Drawings for *The Anatomy of the Horse,* based on Stubbs' dissections. Here, skin is stripped away.

Surface muscles have been removed to show ribs, blood vessels in neck and forelimbs, some tendons.

It was not only his authoritative knowledge of the structure and movement of the horse that distinguished Stubbs' work, although precisely those characteristics probably made him popular at the time. Scholars today point to his other outstanding qualities as a painter. He was George Stubbs the Horse Painter until he was forgotten, and George Stubbs the Horse Painter when he re-emerged; it is only very recently that he has become, for the experts, George Stubbs the Painter, period. Stubbs' paintings stick together. They are carefully and masterfully composed; the balance, design, arrangement of masses and sight lines are harmoniously unified so that, without knowing quite why—unless you study one—you are rapt with contentment. Look carefully at a large canvas for a bit and almost invariably a little grouping—hounds, weeds, some wild flowers—becomes a tiny tableau, exquisitely executed, alive in itself. You have evidence, in painting after painting, with never a sign of sloppiness or haste, of the hand of a master.

And, with all that, he was remarkably elegant. Stubbs could paint the sleek, burnished coat of a mare with the same touch that Dutch, French and some English painters used to portray the glint and texture of silks and satins. But here it is living flesh, and pretty soon it is not just horses you are looking at but works of art that reach you with their formal beauty. Still, these are by Stubbs and so they are horses, too. There is in a horse's neck the power, the momentum and the undulating grace of a great wave, in its muscled hind-

A few muscles and ligaments remain on the skeleton. Nerves leading to the forelimbs stand out clearly.

The skeleton. These drawings were later engraved for the book. They are all graphite on paper.

quarters and massive chest, the elemental flow and force of the land. No false drama, just the horse, Sir.

It is interesting to note that at the Tate at different times of the day you could see a man or a woman in riding boots, worn not for fashion's sake but because the wearer, from the state of the boots, obviously had come straight from the stable. So universal is the appeal of Stubbs that some people came just for the horses, while others were remarking on what a superb formal painter he was, leaving aside the horses.

Like all men of learning in the 18th century, Stubbs was interested in the wild and the exotic, samples of which kept pouring into the country, souvenirs sent back by the intrepid explorers and adventurers of the age. In addition to the commissioned paintings of horses in various settings, he painted a number of pictures of other animals, which are outstanding for his scientific and dispassionate observation and distinguished for his artistry. Among these were the moose, the rhinoceros, leopards, lions, a zebra, monkeys, a cheetah and a tiger which is the very essence of Blake's "Tyger! Tyger! burning bright. . . ."

Stubbs' paintings of animals were so accurate, held so much of the spirit of the beast as well, that there is one case after another where animals were startled by the paintings—a horse by a life-size painting of a horse, a dog by a painting of a dog. In the case of the tiger, Mary Spencer adds a note to the Humphry manuscript: "For the Duke of Marlborough Mr. Stubbs painted a large Royal Tiger, when it was nearly fin-

ished, it happened to stand on the ground in an out building, where some country [farmerlike] men, followed by a little cur dog came to look at it, soon as the Picture caught the dogs eye, he screamed, ran behind his master, trembled, and was guilty of an indelicacy incident to dogs when terrible alarmed, nor would he by any means, be made to look at it again."

Several major themes occupied Stubbs during his career. He would stay with each for as many as 20 or more years, until he was satisfied. Three themes stand out majestically: a series on mares and foals arranged in balletic friezes as graceful and ethereal as any Botticelli (pp. 110-11), a series of a lion attacking a horse (p. 114), and a series of pastoral paintings of farm laborers which are, simply put, entrancing (below).

He was always busy, always at work, and it is somehow difficult to think of him sitting down to read, but he had an extensive library of about 2,000 books; knowing the kind of man he was, you feel he knew what was in them. When he wasn't painting in oils, he was developing a scientific method of painting in enamels on clay tablets in order to preserve, without fading, the original colors of the paint. For this he went to the cultivated potter Josiah Wedgwood for an earthenware plaque larger than any developed to that date, one that would not warp or crack in the kiln. After some years Wedgwood developed one, but Stubbs' work in the medium was never a popular success, beautiful as it is.

Toward the end of his life he suffered a decline in popularity, and there is evidence he had severe financial troubles and had to borrow money from a patron.

In 1795, at the age of 71, he began work on a *Comparative Anatomical Exposition of the Structure of the Human Body with that of a Tiger and a Common Fowl,* which he was still working on when he died 11 years later.

A note by Mary Spencer, in the Humphry memoir, recalls his last hours: "Within an hour of his Death he sayd to his surrounding friends 'perhaps I am going to die,' but continued he 'I fear not death. . . . I had indeed hoped to finish my Comparative Anatomy eer I went, but for other things I have no anxiety'. . . . On the 9th of July 1806, he as usual walked eight or nine miles, came home in very good spirits, went to bed about nine o'clock and at three next morning awoake, as well, he said, as ever he was in his life. On getting up in bed, he was struck with a most excrusiating pain in his brest, and by the moaning he made, was heard by his female friend (who slept in the next room) on interrogation, he said the pain would kill him, at four o'clock he got up and dressed himself, went down stairs, and up again, several times, to Arange some papers, his friends, who were assembled, all thought him a great deal better, he left them at breakfast and returned to his bedroom. One of the party immediately followed him, and by her screams soon brought up the rest of the company, who found him sitting in an arm-chair, another chair he had placed so as to rest his legs upon, wrapt himself in his Gown, and the moment she arrived breathed his last."

He was said to have been so strong he could carry the carcass of a horse on his back up to the dissecting rack. More likely, you feel, after a day or two of looking at his work, he would have cradled a live horse in his arms.

Yale Center for British Art, Paul Mellon Collection

Reapers (1795) is painted in enamels on a clay tablet devised for Stubbs by Josiah Wedgwood.

The superb *Whistlejacket* (1762), not shown at Yale, was yet another Rockingham commission.

Lent by Lady Juliet de Chair

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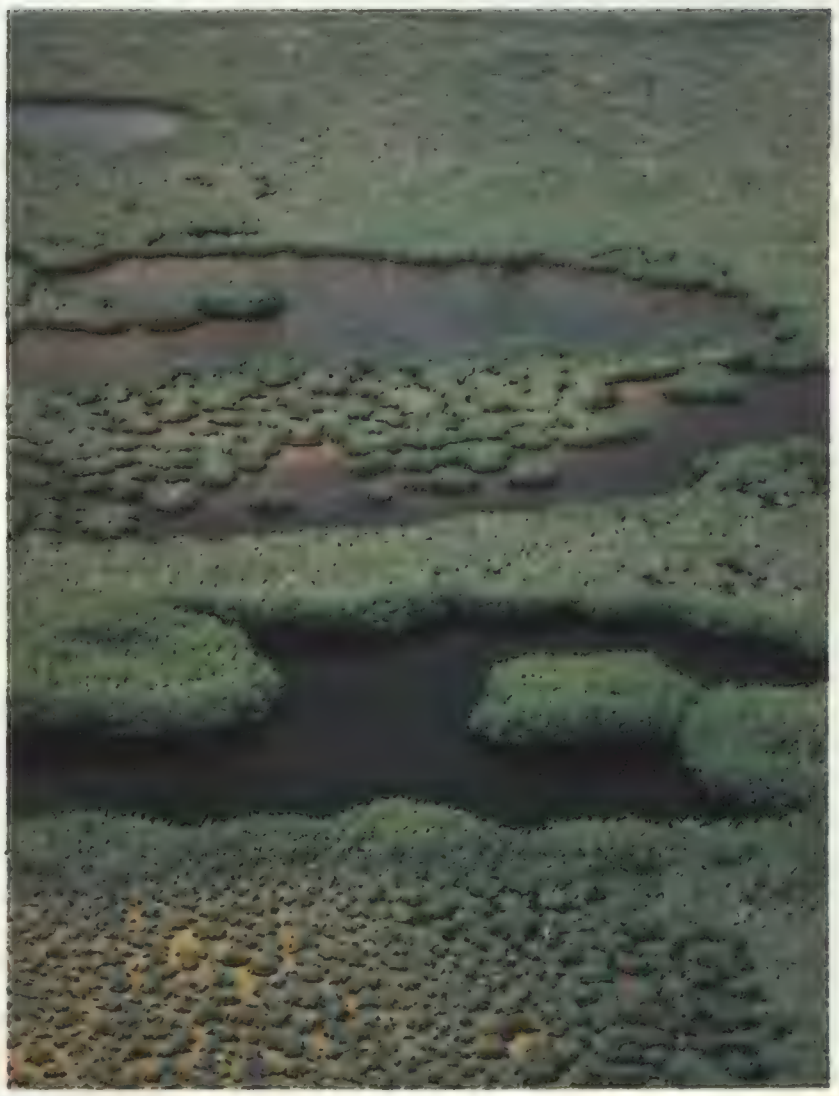
By John P. Wiley jr.

On tropical coasts mangroves blend the forest into the sea

These salt-tolerant trees are the primary producer in an intricate food web as they create habitat above and below the water



Mangrove-lined waterways and small mangrove islands shape the landscape in Everglades National Park.

The world wears a belt of mangrove forests. Nearly impenetrable thickets where trees grow in saline water and mud, they are the salt marshes of the tropics. Nearly 75 percent of the coastlines between latitudes 25 degrees north and 25 south are dominated by the many species known collectively as mangroves, and like the tropical rain forests whose fate tends to dominate the environmental news, they are gaining the attention of scientists even while in some parts of the world they are being destroyed at a fearsome rate.

Mangroves can look monotonous, appearing as a homogeneous wall when seen from a boat, but their clumps and islands are broken by winding channels that to some of us are irresistibly inviting. Inside, whether in a small boat pushing into every open lead, or on foot climbing through the tangle of roots and trunks, they form a natural wonderland where land, water and sky blend into each other. There is something special about sitting in the branches of a tree and watching creatures of the sea from a dry, leafy perch. It is a safe world: sharks and barracudas are there, but in miniature form. And there is something special about swimming underwater with a dive mask, moving through a school of gray snapper that politely makes way for you, only to come up for air and be caught by the inscrutable stare of a pelican perched in the deep green canopy overhead. For those who brave the muck and the jungle gym of the mangroves' interior, there is extraordinary variety. Leather ferns, rubber vines, orchids and spider lilies grow among the trees; in the branches grow bromeliads and feathered puffballs that one day will become herons.

Three species—the red, the black and the white—grow in Florida, where significant stands occur from the Keys as far north as Cape Canaveral on the east coast and Tarpon Springs on the west. Smaller reds and whites grow farther north; black mangroves reach

Roseate spoonbills contest a perch in the branches of mangrove trees on a small island in Florida Bay.

Photographs by Robert Noonan

Above water, a mangrove skipper larva feeds directly on the leaves of its host.

Hermit crab would appear to be contemplating a black mangrove seedling in some shallow water near Plantation Key.

A marine snail, its shell obscured by coralline algae, grazes along the roots.

Coffee-bean snails are feeding on the lower branches of a mangrove. Small crabs and a host of other invertebrates also live there.

almost to Jacksonville and occur as scattered shrubs all along the north coast of the Gulf of Mexico to Texas. In this hemisphere, mangroves grow along both coasts of Central America, throughout the Caribbean, and along the northern coasts of South America. In Hawaii they were introduced in 1905 to control shoreline erosion on Molokai; extensive stands of red mangroves grow there today.

Only in the past 15 years or so have biologists been able to document the role mangroves play in estuarine ecosystems and their value to us, the ultimate predator at the top of the food chain. Like the salt marshes of temperate climates, mangrove swamps can be thought of as nurseries, where many commercially important fish and crustaceans spend part or all of their lives. They produce more than three tons of organic matter per acre per year, a crucial input to a complicated food web that involves not only their immediate surround-

Wood-boring isopods can severely damage the stiltlike roots of red mangrove trees.

Looking more like a twig than a hunter, a praying mantis watches for the unwary.

A small water snake, a common species that feeds on fish, takes the air along aptly named Snake Creek.

A green anole (left) and a brown explore driftwood left high and dry in the mangroves by a storm tide.

ings but also the lagoons, tidal rivers and estuaries that they border. They protect the shoreline from winds and waves. They are an important habitat for creatures of the water, the air and the earth. In developing countries, they provide lumber, firewood and charcoal, tannin, medicines and even alcoholic beverages.

The first recorded reference to mangroves goes back to 3550 B.C. in Egypt. Human use of them for firewood and other purposes must date from much earlier. William Macnae, a South African mangrove expert, mentioned accounts of stands of mangroves with prop roots along sections of the Red Sea and Arabian Gulf more than 2,000 years ago, where none grows today. There is evidence in the fossil record that mangroves date back at least to the Eocene, some 50 million years ago. They seem to have originated in the area of Malaysia and spread from there, evolving and forming new species as they went. V. J. Chapman at the Univer-

Mangrove swamps blend forest and sea

Cassiopeia jellyfish, a familiar sight in mangrove creeks, live a life more like that of a green plant.

sity of Auckland in New Zealand has suggested that the earlier species were able to migrate through the Tethys Sea, between Africa and Eurasia, and into the Mediterranean before continental drift closed that avenue. From there they moved to the west coast of Africa and the Americas, reaching the Pacific coasts of the Americas before the Central American land bridge had closed.

However it happened, it seems clear today that the world has two groups of mangroves. That in the Indo-Pacific, the Old World, is much richer both in numbers of species and luxuriance of growth than that in the Atlantic. Biologists count more than 60 species in the Old World, compared with only 12 in the New. In Florida, there are three.

Mangroves are terrestrial plants that have moved back to the sea, adapting themselves to live in saline water and saturated mud. Venture into a stand, and it is not easy to say where the land ends and the water begins. Go in from the land side, and it's a swamp. The ground gets wetter and wetter, until finally you are walking out into the water just as the trees have done. Approach in a boat, and work your way in among the trees as far as you can. Step out onto what looks like land, and you may sink into the unconsolidated sediments. It is not land at all, but more of an ooze, a very viscous liquid. When you finally do pull your feet out, you will also release the rotten-egg odor of hydrogen sulfide, the sign of an oxygen-deprived environment.

The overwhelming impression is of biological richness; it is like standing on—and in—a compost pile that stretches for miles. The muck is not five percent organic matter, like some good garden soil; it is close to 90 percent.

To travel in mangroves, you have to adapt to them. One day last year, a small band of us followed Pat Healy, ornithologist at the National Audubon Society research center at Tavernier, around Cowpens, a group of islands in Florida Bay, one of which is an Audubon sanctuary. (The name comes from the local legend that manatees, or sea cows, were once kept as a source of meat in the natural bowl formed by the islands. Now the Intracoastal Waterway cuts right through the middle.) Healy moved easily through the mangroves, even while maneuvering a long aluminum pole with a mirror on the end (like an oversize version of the dental instrument) with which she checked the progress of heron nestlings. The rest of us stumbled and splashed along, climbing over prop roots and then suddenly sinking ignominiously into the muck.

The trees themselves are perfectly at home. Howard

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Symbiotic algae in wavy filaments photosynthesize, taking carbon dioxide from water and making food.

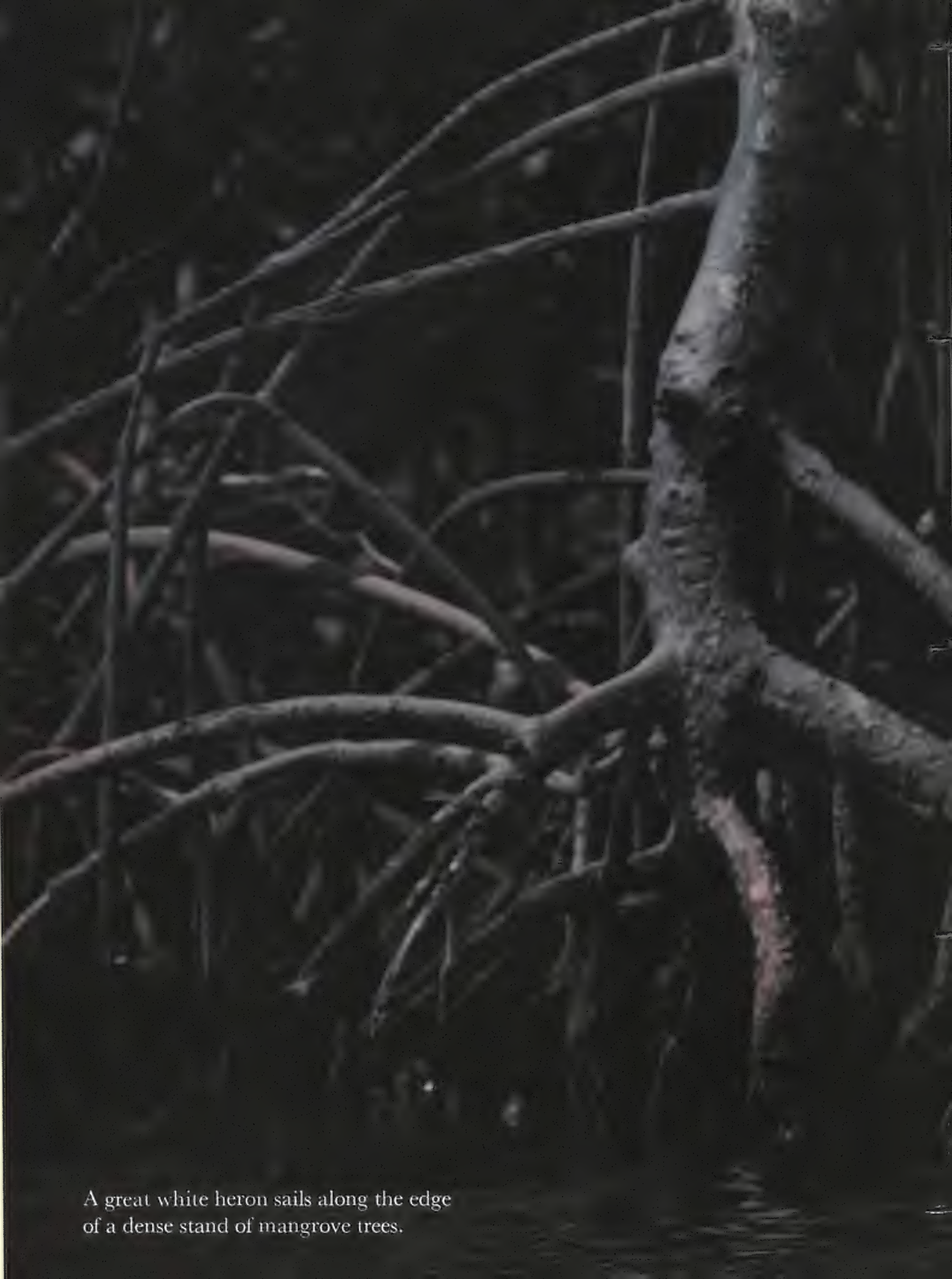
Gray snappers swim among algae-covered mangrove roots. They feed on crustaceans and small fish.

Teas, a specialist in mangroves at the University of Miami, explains that they have solved two problems that normally would make it impossible to grow where they do. The first is that the soil is anaerobic: there is no available oxygen. Like any living tissue, mangrove roots must have oxygen, and they cannot get it from the soil as their upland counterparts do. Instead they take in air through special above-ground pores called lenticels. These are covered by loose waxy cells that allow air to go through but not water. Red mangroves have lenticels on their prop roots. Blacks have them on pneumatophores, fingerlike projections that grow up through the muck. Whites have them on their trunks. From the lenticels the air moves through a system of fibers into the underground roots.

The other problem mangroves face is too much salt. It is the salt that allows them to grow where they do in the first place because it keeps out ordinary trees and shrubs. But even mangroves cannot simply ignore it: the salt content of even brackish water is much higher than that of the sap inside the cells of a mangrove tree. The reds use membranes to prevent most of the salt from entering the roots. Blacks and whites do let more of the salt in, but they then excrete it through small glands on their leaves. Unless it has rained recently, you can frequently identify a black mangrove by the salt crystals glistening on its leaves. Whites do the same thing, but less conspicuously. Blacks and whites do exclude a little, and all three may concentrate salt in a leaf before it drops off.

So far as we know, mangroves can live without either salt or periodic immersion in water—as long as there is no competition from terrestrial species. Mangroves live on dry land in Miami and have survived 50 years on tap water in the U.S. Botanic Garden in Washington. But like any plants, mangroves are sensitive to local conditions. Biologists commonly divide mangrove forests into types of communities, according to where they live and how well they are doing. At one extreme are nutrient-rich riverine forests where red mangroves may reach heights of 60 feet or more. At the other are nutrient-poor areas of south Florida and the Keys, where stunted versions of all three species eke out a living on the thin soil over salty flats of fossil-coral limestone. Here, trees less than four feet high may be 40 years old.

For years some scientists believed that mangrove growth followed a pattern of succession, eventually turning an aquatic environment into a terrestrial one. The analogy was made to terrestrial ponds that eventually fill with vegetation, becoming first swamps and finally dry land. The idea was that the mangroves similarly created land by trapping sediments and gradu-



A great white heron sails along the edge
of a dense stand of mangrove trees.

Mangrove swamps blend forest and sea

Flowers of the red mangrove are seen all year long, but are most conspicuous in the spring and summer.

Prop roots of red mangrove are exposed at low tide. Fallen leaves are the beginning of a complex food web.

ally building up the bottom. As this happened, the species most adapted to living in water would continually advance farther toward the sea, trailing the succession species behind. Terrestrial species were considered to be the climax. There is no doubt that in some places mangroves are marching into the sea. Migration at the rate of 115 yards a year has been recorded in Sumatra; in Java the rate has approached 180 yards a year. William Macnae reported that a seaport visited by Marco Polo in Sumatra is now 30 miles inland.

But opinion is swinging to the opposite view—that mangroves follow rather than lead, that they are effect and not cause. Where land is being formed, as in a river delta or the shallow banks created by marine sediments in places like the Bahamas, mangroves will grow on it, giving the impression that they are building land. In most cases, they are not.

Whether or not they are making new land, mangroves do a lot for the space they occupy. Their physical structure itself provides habitat for other plant and animal life. Above the water, trunks, branches and prop roots look pretty much like any other woody plant. But put on a diving mask and approach them underwater, and it is an entirely different world. Each root is alive with fuzzy, filamentous algae, loaded to many times their diameter with barnacles, oysters, mussels and sponges, with worms, snails and a host of other invertebrates. Small fish are everywhere, protected in the roots from large predators. Crabs patrol the bottom. In the Keys, juvenile spiny lobsters lurk among the roots.

Above water the trunks and branches are home to more snails, the herbivorous mangrove crab, lizards, spiders and at least 200 species of insects. The en-

Red mangrove embryos, called propagules, grow as long as ten inches before dropping into mud or water.

Once a propagule has been in the water for a certain number of days, roots begin developing at lower end.

dangered American crocodile—only about 200 are left—sometimes nests in mangrove swamps in upper Florida Bay and on Key Largo. Terrestrial mammals make use of mangrove swamps, although they are of course not limited to them. Skunks, raccoons and bobcats are commonly found there. River otters dwell among them, and Florida panthers are seen.

The most conspicuous users of mangroves are the birds. For birds, mangroves add a new dimension—the vertical—to shorelines. Rich mud flats and thick growth of trunks, branches and leaves offer a complete habitat for feeding, resting, roosting and nesting. All the usual marsh, wading and water birds are there. Shorebirds—willets, plovers and dowitchers—probe the ooze. Other wading foragers are there—the herons, egrets and white ibis—stalking and striking. Surface feeders and divers are there, the terns and kingfishers plunging into schools of baitfish.

In south Florida, some birds nest only in the mangroves. One survey found that 100 percent of the roseate spoonbills (p. 122) and brown pelicans nest there, as does the uncommon reddish egret. The great white heron, a south Florida color phase of the familiar great blue, nests on the mangrove islands in Florida Bay. Other birds choose the mangroves in varying degrees. About 90 percent of the great blue herons choose mangroves, as do 70 percent of the tricolored herons, 80 percent of the double-crested cormorants, and perhaps half the snowy egrets. The mangroves can also be a haven of last resort for other birds. Normally only about ten percent of the white ibis nest in mangroves, but when drought strikes the Everglades, breeding colonies in mangrove areas near the coast account for the only reproduction.

In their community profile of south Florida mangroves, William E. Odum, Carole C. McIvor and Thomas J. Smith III reported that 181 species of birds use the habitat at one time or another during the year. At least 66 are known to nest there.

The authors state flatly: "The bald eagle, osprey and peregrine falcon are dependent upon mangrove ecosystems for their continued existence in south Florida." Both the eagle (p. 133) and the osprey feed on the fish population and roost and nest in the mangroves. Peregrines winter there, establishing territories in which they feed on shorebirds and waterfowl.

To an outsider, the mangroves of south Florida appear to support a richness of bird life seldom seen in temperate zones. Drifting in the Marco River at sunset, past islands known simply as A, B and C, one can watch long lines of pelicans, as many as 200 to a group, coming home to roost from their fishing grounds to the southwest, while white ibis in equal numbers arrive from the marshes to the northeast. Anywhere from 4,500 to 20,000 birds of 12 to 14 species roost on these islands.

And yet the experts are worried. Bernie Yokel, estuarine ecologist and president of the Florida Audubon Society, says there may be 150,000 wading birds in south Florida. They face their second crisis in little more than a century, and one more difficult to resolve. According to Yokel, there may have been nearly 2.5 million wading birds in south Florida in 1850. Some were killed for food (white ibis were once known as Florida chicken), but it was the plume hunters who nearly did them in. Protection came early in this century, and by 1930 the population had rebounded to about two million. Now it is dropping fast.

No one can say for sure what is happening. Most biologists agree that it probably has something to do

Red mangroves, front, have rooted in white mangrove forest at the Fairchild Tropical Garden in Miami.

A young black mangrove grows amid its pencil-like pneumatophores in a hollow in limestone rock.

with the changes in water flow through the Everglades. That is now completely controlled, with water being released only at certain times and places. They suspect that this change has in turn caused the fish populations in the estuaries to decline, reducing the food supply to fish-eating birds. James Tilmant, a marine biologist at the Everglades National Park research center, says scientists are now working to determine just what fish the herons eat and whether these kinds of fish would indeed be affected by the flow of fresh water.

Panhandling herons raise more young

There is some interesting evidence that fish populations are the limiting factor for some birds. George V. N. Powell, of the National Audubon Society's research center at Tavernier, has discovered that panhandling great white herons—those that solicit food from humans—reproduce with greater success than do those that depend strictly on natural sources. Powell studied herons that nested on mangrove islands in Florida Bay and did their begging in the Keys. He found that their clutch sizes were larger and that they fledged more young. The clutch sizes of the natural feeders were not only smaller than those of the panhandlers, they were smaller than for herons in other parts of the country and smaller than the clutch sizes in the same part of Florida Bay back in 1923.

As added evidence for a causal relationship between smaller fish stocks and declining bird populations, a National Park Service study conducted in Florida Bay revealed that the numbers of ospreys—a fish-eating bird—had dropped over a ten-year period but is now leveling off. Young ospreys had been found starving in the nest, presumably because parents had been unable to find fish to feed them.

The mangrove is far more than the physical substrate for other forms of life. It is the beginning of life, the organism that makes its own food and thus is the source of food for other forms of life. It is the mangroves that capture the energy of tropical sunlight and turn it into food—not directly for the spectacular creatures that humans come to see but for the uncounted millions of microorganisms that work the litter on the bottom.

The mangrove food web begins with a leaf falling into the water. Crabs and snails break it up, and soon the pieces are covered with a frosting of bacteria, yeasts and fungi. The leaf begins to fall apart into even smaller particles, while protozoa (microscopic animals) arrive to graze on the bacteria and fungi. The bits of leaf, called detritus, with their cargo of bacteria, fungi and protozoa are now a rich food for small fish and for worms, crustaceans and countless other invertebrates. These in turn are the prey of larger car-

A bald eagle uses a young mangrove as a platform to tear apart and eat victim, apparently a cormorant. When the eagle finished four hours later, all that was left of its prey were two long black feathers.

An adult little blue heron and a chick keep an eye on things from their refuge on a mangrove island.

Immature yellow-crowned night heron peers over mangrove leaves at a nesting site in Florida Bay.

nivores, crabs, eels and bigger fish. At the top level of the mangrove food web are the names we know best: snappers and jacks, red drum and sea trout, tarpon, dolphin and snook under the water, and the herons and egrets, eagles and ospreys overhead. All from a leaf that fell into the water, the tons of leaves that each acre of mangroves drops into the water, one at a time, in the course of a year.

Humans have learned to value this production. The millions of pounds of pink shrimp caught off the Tortugas spend part of their life cycle in the Everglades mangroves. Macnae put together records of catches from Mozambique east to north Australia and calculated that 250 acres of mangroves produced four tons of shrimp a year. Numbers for finfish are smaller, but the Florida mangroves alone contribute millions of pounds to the commercial catch. Aside from commercial considerations, mangroves are habitat for some of our most spectacular birds, and for at least seven endangered species, including American crocodiles and the Atlantic ridley (a sea turtle).

In Florida, mangroves are increasingly protected. The tide probably turned for good in 1976 when the Corps of Engineers rejected a proposal to dredge and fill 3,000 acres of mangroves on and near Marco Island for commercial real estate development (SMITHSONIAN, January 1977). The developers came right back in 1977 with an application for 4,000 acres, only to settle last year for just 300. For the right to develop 300 acres of mangroves and some valuable upland property near Miami, the company deeded 13,000 acres of mangrove wetlands to the state.

Developers have been assessed as much as $800,000 for cutting mangroves, with fines based on the assumed productivity of the trees. Dade County requires a landowner to obtain permission not only to cut down a mangrove, but even to trim it for a better view of the water.

In fact, the losses in Florida have not been very great. Odum, McIvor and Smith estimate that only five percent of the mangroves that were there in the last century have been destroyed. (The percentage reaches 100, of course, in heavily developed areas, as in portions of Biscayne Bay.) Depending on how the counting is done, as many as half a million acres remain in Florida.

In other parts of the world, mangroves were often seen as something to be used rather than preserved. For millennia they have been cut for firewood and charcoal, as well as lumber for buildings and boats. Their habitat has been converted to fish farms, rice paddies and salt ponds.

Even in Third World countries with a real and present need for firewood, however, the tide is changing. Indonesia, for example, has about nine million acres of mangroves, and traditions many centuries old of exploiting them. But now the nation is moving toward management and even protection. Some areas are harvested on a 30-year cycle; forests are divided into 300-acre tracts, and just ten acres are cut each year. The government now requires that a belt 45 to 180 yards wide be left along the coast.

A great white takes to the air from a shallow bank peppered with mangrove seedlings. Note band on leg.

Mangroves are being planted these days in places where they once grew and in places they never grew. Howard Teas in Miami has experimented with replanting, and has introduced them along causeways and on dredge islands. He has even developed a method for planting from a helicopter: seedlings are placed in paper bags with fertilizer and weighted with sand; fins or paper tails are attached. They splash into the mud in an upright position.

Given half a chance, the mangroves will do it themselves. All three Florida species are viviparous: their embryos develop while they are still attached to the parent plant. Known as propagules, these young plants drop off the trees into the water to be carried wherever the currents take them. Those of the red mangrove are eight to ten inches long (p. 131) before they drop; they can be a major part of the wrack floating around the prop roots.

The sight of young trees emerging from salt water (below) is startling at first. Mangroves thrive where no other terrestrial trees can live, and create an ecosystem all their own. They are coming into their own as well, as they are increasingly appreciated as a resource and as an important part of tropical biology.

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By Neil Letson and Peter C. Keller

How an earthquake brought to light the opulent treasure of Popayán

One of the world's great ecclesiastical art collections, seldom seen even in its native land, starts to get worldwide attention

The earthquake came at 8:13 A.M. First a low roar, then a sickening jerk that turned masonry to rubble and threw men and animals to the ground. The earth opened in places and swallowed everything. A creek called the Río Molino temporarily changed its course; ponds were sucked down and disappeared. Cemeteries gave up their corpses and geysers of raw sewage appeared in the streets. This was the city of Popayán, 5,773 feet high in Colombia's Cordillera ranges. It was Maundy Thursday, March 31, 1983.

In 18 seconds it was over. About 85 percent of the city was damaged and at least 250 people were killed. More than 1,000 were injured. Thirty thousand people were without housing, 53,000 children were without schools, nearly 5,000 places of business were totally destroyed and all of the churches suffered major damage—including the collapse of the domes of the newly restored cathedral (opposite), crushing a hundred worshippers.

Soon afterward stories began to circulate among a few people beyond the city of a fabulous treasure of ecclesiastical objects which had survived the earthquake. Gradually it was realized by the professionals who keep track of precious bejeweled art that the treasures of Popayán—about which little has been published until now—were among the finest and most spectacular to be found outside the Vatican.

The story of why these objects are in this remote Andean city is an intriguing one. In the 17th and 18th centuries, the leading families of Popayán acquired great wealth from mining and cattle ranching, but had few outlets for display or extravagance. They sought opportunities to demonstrate piety and affluence, and so they became rivals in the lavishness of their gifts to the church. Such gifts were customary in all of Spanish America, but the situation was different in Popayán since the wealthy did not have to send to Spain for their opulent offerings.

There is an ancient and fruitful tradition of working with gold in Latin America and particularly in Colombia, a country noted for its Indian archaeological treasures which go far back into history, long before Europeans came to the continent.

The transition from indigenous early work that predates the Christian era, to the ecclesiastical styles introduced by the Spanish colonialists was just that—a matter of combining different styles and cultures. The technical ingenuity of working with fine metals was already there and had been since long before the Spanish invaders arrived.

There was another advantage: proximity to the raw materials—silver, gold and emeralds. They were all abundant in nearby mines. As the centuries passed, the Popayán treasure grew until it became one of the most valuable and historically important liturgical collections in the world.

Nevertheless, it remained little known outside Colombia. Each year the objects were paraded through the streets of the city during Holy Week in daylight and candlelight processions, a tradition dating back to the early days of the Christian priests in New Granada. But otherwise they were displayed sparingly and usually singly. Because the area was plagued by earthquakes and sat at the foot of the active Puracé volcano—and because of unsettled political conditions—it was always deemed risky for the precious objects to be kept in a single location. Instead, they were customarily kept in the houses of the

In composite picture, gold monstrance of Cathedral of Popayán appears in earthquake-ravaged nave.

Photographs by Harold and Erica Van Pelt

This tabernacle for holding a ciborium was made in Popayán and completed in July 1842.

families who had donated them to the church, and their locations, if not precisely secret, were also not widely advertised.

The wisdom of this long custom of "dispersal security" was borne out when the earthquake struck. Many valuable paintings, frescoes and carvings perished in the collapsing buildings, and a great silver throne of exposition was crushed in the rubble of the cathedral. But, bit by bit, the people learned that most of the widely scattered jeweled altar relics had survived.

Ironically, had it not been for the earthquake, the existence of the objects might well have remained shrouded in obscurity. As the people were struggling to rebuild their ravaged city, the Archbishop of Popayán agreed that the holy works should be described, photographed and recorded by scholars so that the world at large would become aware of the great cultural heritage that resided there—and that had so nearly been lost.

It is not all that unlikely that such superb craftsmanship should be found in Popayán, for it has been a cultural and religious center of the New World since its founding in 1536 by Sebastián de Belalcázar, the hard-bitten lieutenant of Pizarro in the conquest of Peru, who was later appointed first governor.

In the 16th century, Pope Paul III made Don Juan del Valle the first Bishop of Popayán, and the Church assumed its powerful and continuing role in the development of the city. A simple straw-roofed structure, its first church, was pulled down, and in 1594 work on an imposing cathedral began on the south side of the central plaza; construction continued until 1604, with a now famous bell tower being added in the 1670s. The Franciscan, Dominican and Augustine orders built monasteries and convents nearby, and the Jesuits founded the Royal Seminary College.

In the four centuries since its founding, little has changed philosophically in Popayán. Superficial changes have come almost as slowly. It seems to view the modern world through academic and artistic rather than commercial eyes. It has given Colombia 17 of its Presidents and was the birthplace of Francisco José de Caldas, astronomer and mathematician, and of General Tomás Cipriano de Mosquera, writer, geographer and four times President of Colombia.

The treasure of Popayán includes golden chalices, crowns set with precious gems to adorn numerous figures of the Virgin, a series of saints, vestments and holy vessels. But without doubt the most noteworthy objects are a series of remarkable monstrances (called *custodias* in Colombia).

The jewel-studded gold monstrances, usually two to three feet in height, display the consecrated Host for adoration; each one is topped with a radiating superior circle known as the sun, with a round crystal window behind which the sacred Host is visible.

Neil Letson is a journalist and historian of jewelry. Dr. Keller, a gemologist, is a project consultant to the Natural History Museum of Los Angeles County.

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Imposing monstrance, about 39 inches high, dates from 1673 and is encrusted with 1,850 baroque pearls.

Miniature examples of artisan's skill show ingenious elegance. Crown, lower left, is about two inches high.

The sun is supported by a central stem, sometimes taking the form of an enameled figure of an angel or saint, in turn set on an elaborately decorated base.

There are many such monstrances in the Popayán treasure, but the richest of all is the Custodia de el Corpus (p. 138), used only during the celebration of Corpus Christi in the cathedral. It stands about two feet high and is set with 671 emeralds with a total weight of more than 500 carats. On the base of El Corpus are mounted four spectacular emerald cabochons of 35 carats each, surrounded by a total of 64 smaller stones. While the sun is of early 18th-century workmanship, the stem and base are later, probably mid-19th century, and are mounted with approximately 200 small emeralds of a quarter-carat each.

In addition to the monstrances, the Popayán goldsmiths created large and elaborate silver-covered tabernacles used to hold smaller ciboriums containing the sacred Hosts. One of the most impressive is the tabernacle from the cathedral (p. 140), embossed with the motif of a lamb, symbol of Christ.

Ecclesiastical crowns also figure prominently in the Popayán collection both in large numbers and in a

WHY WAIT FOR
HER BIRTHDAY?

WHY WAIT FOR
HIS BIRTHDAY?

WHY WAIT FOR
FATHER'S DAY?

WHY WAIT FOR
YOUR NEW APARTMENT?

WHY WAIT FOR
SATURDAY NIGHT?

WHY WAIT FOR
YOUR PROMOTION?

WHY WAIT FOR
YOUR NEXT RAISE?

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Monstrance of La Ermita, Popayán's oldest chapel, has a wheat-sheaf motif, symbolic of the sacred Host.

Monstrance of Church of Santo Domingo is two feet high, has 112 emeralds and more than 1,000 pearls.

wide variety of forms. Some resemble the royal crowns of Europe, while others are stylized versions of the feathered headdresses worn by Andean Indian nobles.

The most famous of these gold-and-emerald crowns, known by the rest of the world as the Crown of the Andes, is the only item ever to have been lost from the Popayán treasure. It was sold in the 1930s amid a flurry of deep local concern over having a national treasure leave the country, and today is in private hands in the United States. Remaining in Popayán, however, are the beautiful gold-and-emerald necklace and earrings made as a set with the Crown of the Andes and used to adorn the same wooden polychrome figure of the Virgin Alada.

Few of the early goldsmiths of Popayán signed their work. Some, like Juan Alvarez Quiñones, were men of substance, but most were anonymous craftsmen whose faith breathed life into the altars of the Roman Catholic Church all across the Spanish Americas. One of the rare signed pieces in the Popayán treasure is the monstrance of the 17th-century Church of San Francisco (p. 146). The craftsman's signature, in typical Latin script, appears on the rod that connects the sun to its base: Joseph de la Iglesia, 1740.

Another example of a craftsman's signature appears on the base of the same monstrance, a handsome but obvious replacement made by the goldsmith E. Paredes of Popayán in 1868. Many of the bases of the monstrances are replacements, for reasons directly related to Colombia's turbulent history. The original bases of heavy gold were melted to help defray military campaign expenses in the country's war for independence in the early years of the 19th century. The original solid-gold base of the monstrance of the Church of San Francisco was donated in 1814 to finance the campaign of Gen. Antonio Nariño against the Spanish garrison in the city of Pasto, south of Popayán. The replacement base is gold-plated silver rather than solid gold. While the base is more restrained than the upper parts of the piece, the emer-

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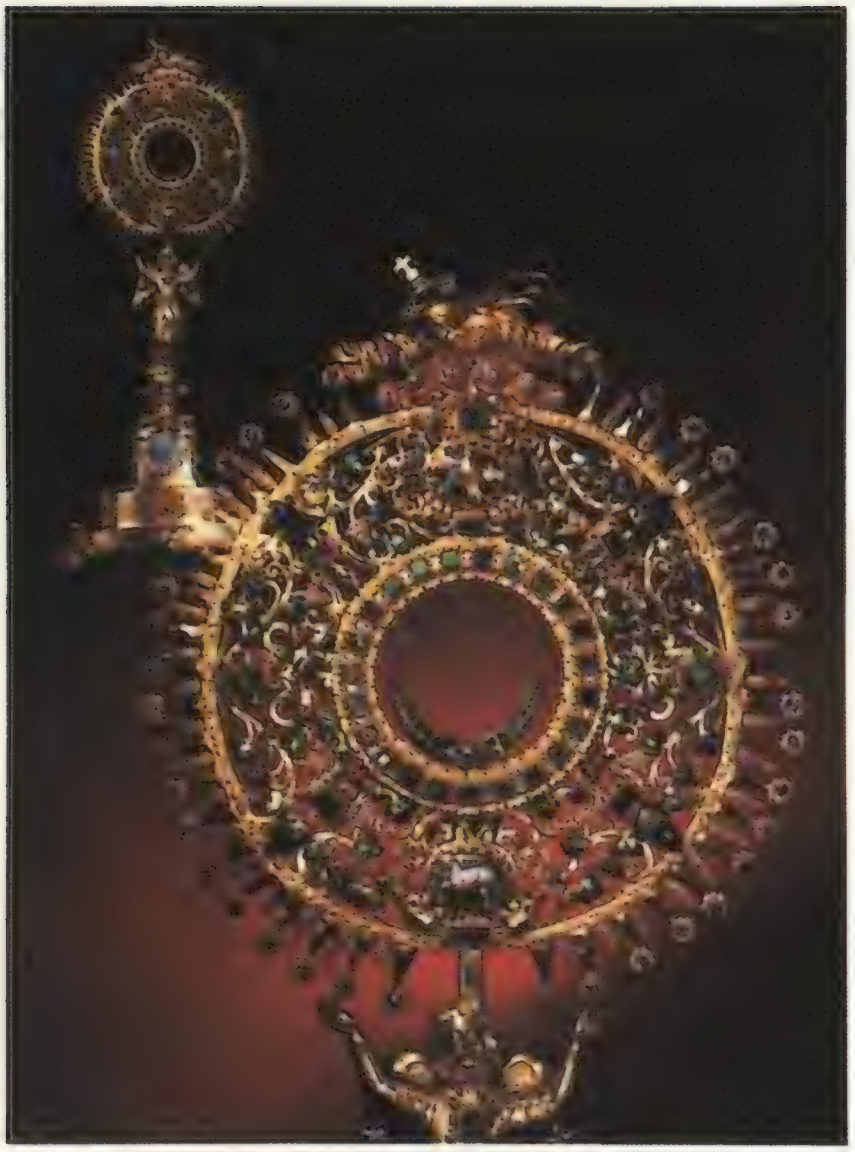

Double exposure shows monstrance of Church of San Francisco and upper section with 185 emeralds.

alds and gold are the most lavish of any monstrance in Popayán, and the piece has the most complete documentation.

The 17th- and 18th-century goldsmiths were frequently faced with the problem of obtaining emeralds of equal and uniform color, an almost impossible task from both the standpoint of availability and high cost. Usually, only stones cut from the same crystal will yield matched colors. The large proportion of finely matched pieces in the Popayán treasure indicates that great importance was attached to the presence of splendidly uniform gems.

Sometimes the goldsmith had to resort to the use of glass to simulate the precious stones. One particularly striking example is found in the monstrance of the Church of Santo Domingo (p. 144), on which the artisan used precious jewels as well as partially faceted slabs of dark blue-green glass resembling high-quality emerald crystals. Diamonds, rubies and sapphires, not indigenous to Colombia and prohibitively expensive, were almost always beautifully simulated with colored glass. Such glass imitations are dramatically exhibited in the monstrances from the Church of San Agustín and the Chapel of La Ermita (p. 144) and no effort whatsoever was made to conceal the use of man-made jewels rather than natural gemstone material.

A setting technique used in many of the 18th-century Popayán pieces is known as "cut-down" setting, and involves working the metal around the edge of the stone to provide smooth retention and an airtight closure. At intervals the setting is reinforced by narrow vertical ridges to give greater security and for ornamental effect.

Even though Popayán became a bishop's see in the mid-16th century, the gold and jeweled treasures seen there today date from a century later. Nothing remains of the 16th-century work, and very little can be seen from the 17th century. The earlier jeweled objects were less exuberant in design and underwent periodic stylistic alterations to reflect the increasing affluence of the donors.

The earliest and perhaps the most secular in design is the monstrance from the Church of San Agustín, dated 1673 and made in the form of a double-headed eagle surmounted by a crown, reminiscent of the royal arms of the Hapsburg dynasty of Europe. It is completely covered with 1,850 natural pearls from Caribbean waters and topped with an addition of later and finer workmanship, a cross of splendid emeralds with two pearl drops (p. 142).

One of the caretakers of the treasures of Popayán is Archbishop Samuel S. Buitrago Trujillo, whose main activity for the past two years has been aiding the recovery of the people and directing activities related to the restoration of the city.

Linguist and scholar, the Archbishop's serious mien only thinly masks a warm sense of humor and an obvious concern for the art objects in his charge and also for the people of the city. Restoration of the cathedral and the dozen or so major churches must come only after the houses and schools have been replaced. Contributions for the work have come from all across the world, but an awesome task remains.

While the Popayán treasure survived the 1983 earthquake, its future is uncertain, although it is likely that in the months ahead it may once again be seen by the public. In 1983 the Bank of the Republic of Colombia opened its newest museum, the Museum of Religious Art, in Bogotá. Only time will tell whether the Popayán treasure, no longer practical for its intended daily use, will find a home in the new museum or will remain in Popayán, to be paraded once again in the Holy Week's candlelight processions.

Enlarged finial of monstrance on opposite page shows God the Father with outstretched sheltering arms.

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Brandywine River Museum

By Phil Patton

The Brandywine Valley: preserving the pastoral for present and future

Photograph shows Lafayette's Quarters, Brandywine Battlefield Park, as it is being maintained today.

At left is artist Andrew Wyeth's tempera painting of the scene, a creative reordering of the landscape.

In 1941, Andrew Wyeth painted a now famous view of the Revolutionary War battlefield of the Brandywine and the old house that served as quarters for the Marquis de Lafayette.

The perspective is from a hill, topped by a huge sycamore that dominates the picture (left). The building itself is square and solid, a typical local building of fieldstone. There is just a glimpse of water: a silver arc behind the brow of the hill. Beyond the house, a low horizon curves upward, as if in token of its fecundity, toward a gray autumn sky, a composition of hills punctuated with neat bales of hay and precisely spaced corn shocks.

The overriding impression of the painting is of the wholeness of this landscape. The easy interrelation of its parts is as sturdy as the stonework of the house, as harmonious as the combination of history, agriculture, industry and art that has made the Brandywine Valley one of the most valuable and exemplary landscapes in the country.

Wyeth's painting hangs today in the Brandywine River Museum, part of the Brandywine Conservancy. The work of the Conservancy testifies to a remarkable record of preserving art and landscape in tandem. The inseparability of the landscape and the art that grew from it was first made clear in 1967, when a danger to the landscape led to the creation of the Brandywine Conservancy, which in turn engendered the museum. An oil company announced plans to build a tank farm—one of those sprawling collections of huge steel hatboxes—on the 8½-acre site of Hoffman's gristmill.

Local residents, led by George A. Weymouth, now the board chairman of both the museum and the Conservancy, mounted a campaign to buy the mill and

Generations of artists have found inspiration in its beauty; now its citizens are trying to keep its lands, waters and history intact

Photographs by Stephen R. Brown

The Brandywine River Museum, former gristmill, is one of the country's most popular rural art centers.

Looking not unlike a figure in one of his paintings, Andrew Wyeth paid a visit to the museum recently.

land and turn it into a museum celebrating the art for which the Brandywine Valley had become famous—the art of Howard Pyle, of N.C. Wyeth and his family Andrew, Henriette, Carolyn and Jamie Wyeth, and Peter Hurd; of Frank Schoonover, Jessie Willcox Smith, Harvey Dunn, Jasper Cropsey, William Trost Richards and others.

The architects did all they could to keep the museum in touch with the building's environment and history. Since it opened in 1971 it has had more than two million visitors. "We realized that the art was the crucial element in preserving the landscape," recalls George Weymouth.

Sandwiched between the expanding suburbs of Philadelphia to the northeast and Wilmington to the south, the Brandywine Valley is especially vulnerable to the danger of rampant development. All its attractions conspire to threaten its ruin. Its rich agricultural land—settled and tilled by a mix of Swedes and Englishmen, Finns and French, Catholics and Quakers—is a lure to long-distance commuters and weekenders as well as full-time farmers. Even the appeal of the area's art can be packaged: a conference room in the local Ramada Inn is called the Wyeth Room.

More than a million tourists annually visit the area, as much to catch a glimpse of how the upper half lives, or lived, as to enjoy the natural beauty of the valley.

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This was the backyard of the du Pont family, and the valley has many mansions of various du Ponts situated within it. There is the Peirce-du Pont House at Longwood Gardens, west of Chadds Ford, and a succession of other houses as one tours the area: E. I. du Pont's Eleutherian Mills, part of the Hagley Museum; Winterthur (SMITHSONIAN, May 1983) and Nemours. All are open to the public.

The primary associations of the word landscape are tied to painting—it is often prefaced by "lovely" or "scenic" or some similar adjective. And because we associate it with painting, we think of landscape as more natural than man-made.

But the word shares its Germanic roots with the verb *schaffen*—to create. In a time when raw land—complete wilderness—was something to be feared and conquered, landscape suggested a harmony of human improvements and creations with the domesticated beauties of nature: land as shaped by Man.

People would look at a landscape like that depicted in Wyeth's painting in different ways. Those of esthetic bent wanted the meadows and valleys saved solely for their beauty; students of architecture wanted the old house saved for its style, those of history for its associations. People with farsighted understanding of natural resources wanted the river kept clean, the woods protected.

The Conservancy helped bring these interests together in a common land-use policy. While the museum works to protect the area's artistic legacy, the Brandywine Conservancy is dedicated to the often complicated and tedious work of preserving open space, clean water and historic buildings. Its tools are tax-deductible easement donations, development codes and preservation guidelines. Its Environmental Management Center uses computerized stations to monitor the level and quality of the river.

The Conservancy's efforts at historic preservation, over the years, have led to the identification of about 10,000 buildings in Chester County, Pennsylvania. It managed to have many of them put on the National Register of Historic Places. The most recent effort is to designate all the eligible buildings along the Brandywine—including its remaining old mills—for the Register, neatly blending the most important natural feature of the valley with the most important local works of Man.

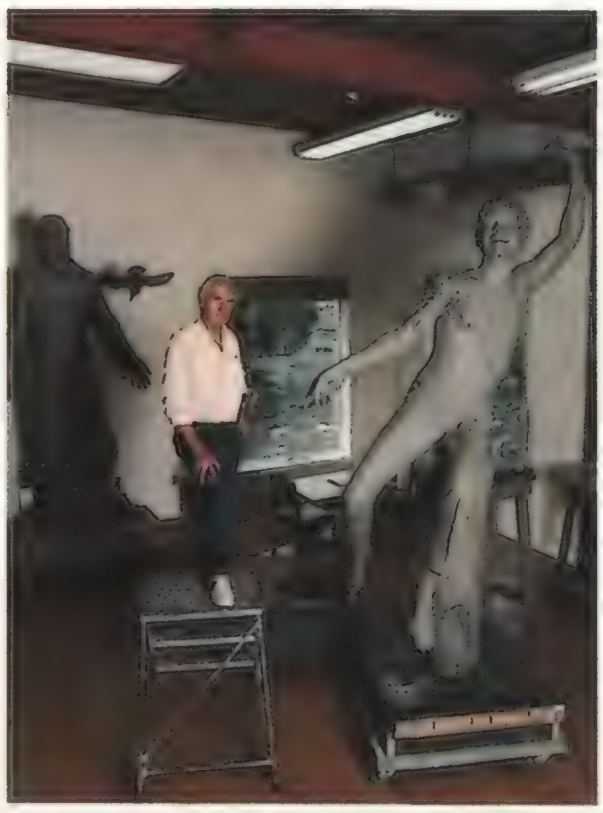
The legalities of this sort of preservation are guaranteed to make the eyes of even the best-meaning citizen glaze over. But the lawyerly clauses and easements have physical equivalents we can all appreciate: the meadows saved from a subdivision, the old inn preserved in defiance of the fast-food franchise.

Not the least of its contributions is that, in all its efforts, the Conservancy has developed programs that serve as a model for other areas. Much of its work today involves consulting for towns and regional groups with similar aims. The legal and organizational techniques it has developed to protect land and water resources can be applied elsewhere.

But if the valley has served as a model for preservation efforts around the country, it has also raised a

Self-taught local painter Jimmy Lynch relaxes in studio.

George Weymouth, painter, is head of museum and Conservancy.



Sculptor Charles Parks poses in his Wilmington studio.

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At home on bank of Brandywine River, just outside museum, is J. Clayton Bright's placid sculpture.

central question for government and public-interest groups around the country: that of the public versus the private role in preservation.

Americans have always clung tightly to notions of total private control over real estate. We trust in the workings of the free market, even when it threatens to despoil our land, and grow suspicious of government regulation or ownership of land.

The success of the Conservancy is one accomplished by private initiative and private funding in such a way as to overshadow public agencies. The Brandywine Valley, after all, is still the bailiwick of the du Ponts and other local gentry, as it has been since the early 19th century. The Conservancy has been able to engage both their self-interest and wealth—and those are resources few other areas can turn to.

It is at least partially a failure of government that the public must depend on the beneficence of private interests to accomplish preservation for the public. There are about 100 separate organs of government in the area, ranging in size from counties to townships. But there is no regional planning organization, no political unit with the responsibility or resources to undertake the work the Conservancy has pursued.

Local officials and residents welcome the work of the Conservancy. The prevailing attitude resembles that of prosperous citizens toward a powerful but beneficent factory that drives their economy. Some developers remain skeptical, to be sure: they point to the economic benefits enjoyed by areas to the north, in the high-technology belt near King of Prussia, as a contrast to preservation. Earl Baker, chairman of the Chester County Board of Commissioners, who teaches political science at Temple University, says that most "welcome the existence of private-sector organizations —for education and for independent sources of information. We're lucky."

A preference for private vs. public

Some of the Conservancy officials, like environmental management director William H. Sellers, who has worked for several government agencies, have seen firsthand what they consider the inefficient efforts of state and local governments at environmental preservation. Others believe strongly in traditional ideas of the role of philanthropy.

Local farmers also appreciate the protection the Conservancy's efforts have provided them against the economics of development. Although agriculture is slowly but surely declining in the area, it remains the linchpin of the economy.

The Lafayette house is characteristic of the local architecture the Conservancy has protected. It possesses not only a tidy order carefully composed of the

To celebrate acquisition of King Ranch, Conservancy supporters surveyed new domain from horseback.

random shapes of fieldstones, but something more—what Wyeth once called the "poignant and powerful feelings of walls two-and-a-half-feet thick."

Recently Wyeth said: "The Brandywine museum is very beautiful and important, but the Conservancy is more important because preserving landscape for artists in the future is important. Without the Conservancy it would all be gone—it would be terrible. The country would be bulldozed away—it would all be a development. The Conservancy is the whole reason for keeping it open. Yet it's not overdone, like a park—it's very natural."

George Weymouth lives in a 17th- and 18th-century stone house called Big Bend, one of whose rooms served as an Indian trading post. A Revolutionary War soldier was buried beneath its floor. Weymouth restored the building and filled it with paintings and antiques, now illuminated mostly by candlelight, which he prefers to electricity. Weymouth, a du Pont on his mother's side, also prefers carriages, of which he maintains several, to automobiles, and looks more kindly on a great many aspects of 18th-century life than on those of the 20th.

In addition to his work heading the museum and Conservancy, Weymouth is an excellent painter, a master of the detailed tempera, as in such paintings as *August* (1974), complete down to the shape of the last leaf of Queen Anne's lace, the precise hue of Canada thistle. He is a much-sought-after portraitist.

But running the Conservancy and the museum called for additional skills as well—those of the environmentalist. "And when we first started," Weymouth admits, "we had trouble finding environmental experts who were also conscious of esthetics.

"At one point people had tried to preserve things by eminent domain, and it didn't work. So we had to do it piece by piece. We found legal tools to use for preservation. They were going to build a highway that would have destroyed dozens of historic buildings. We stopped the road by having some of them put on the National Register of Historic Places."

Weekends, Weymouth can be found driving his car-

Mr. Patton is the author of Razzle Dazzle: The Curious Marriage Between Television & Professional Football. *He also writes widely on the arts.*

An old and picturesque wagon, gentled by autumn leaves and colorful weeds, also supports a rain gauge.

riages across the meadows of the valley or attending some of the various equestrian events in which the neighboring gentry delight. Many of these are also fund-raising events for the Conservancy.

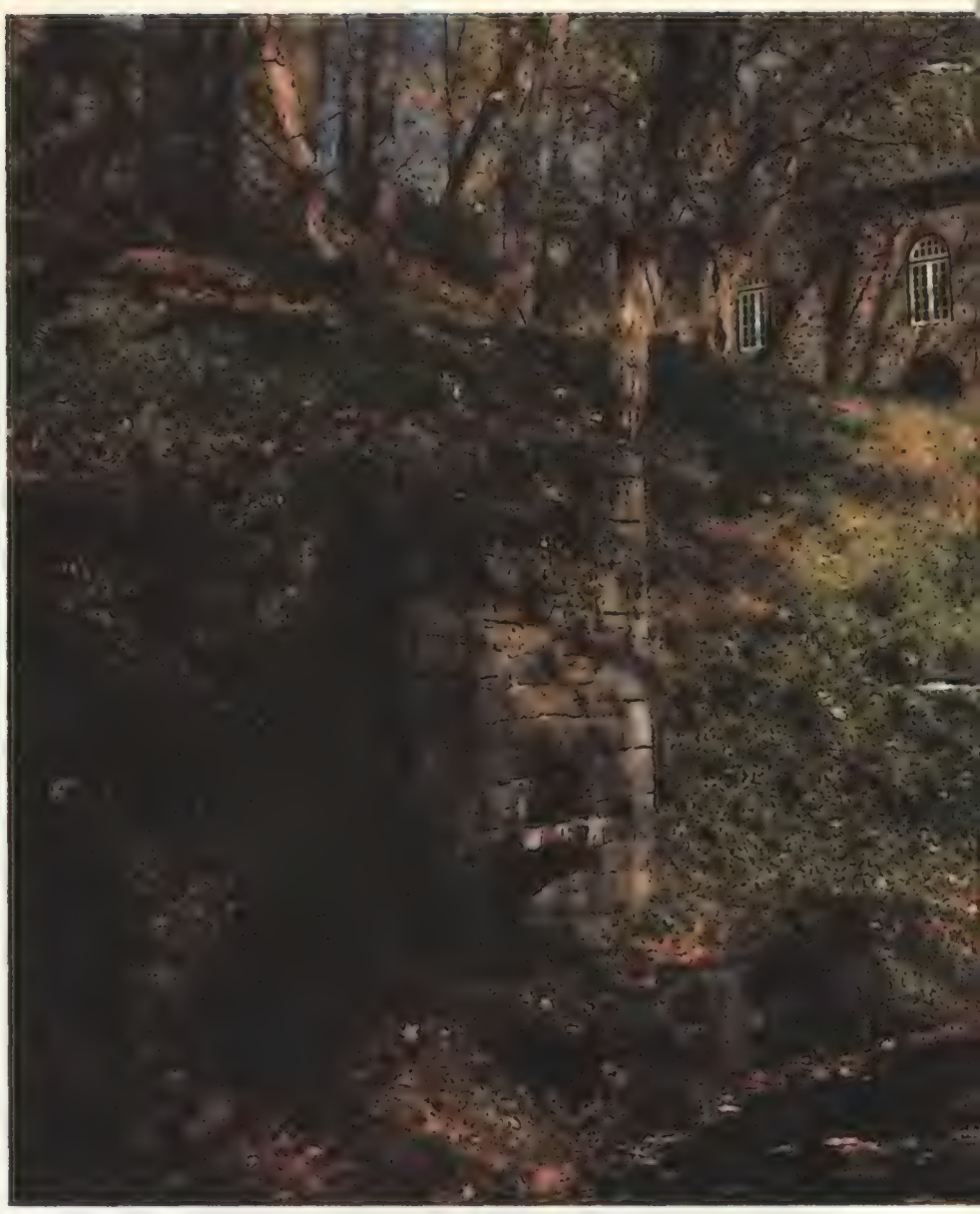
With so much of the land devoted to these aristocratic avocations, it is natural to ask, as some developers and residents in the Brandywine Valley do, whether the preservation efforts are not more oriented toward saving the landscape for private pursuits, for fox hunting and carriages, for example, or for subject matter for genteel painters.

George Weymouth reacts strongly to any implications of selfishness in the Conservancy's actions. "This is beautiful land," he says, "but we are not just preserving it so people can paint it; clean water is most important. It's not the landscape itself that created the art, it is the art that makes us see the landscape a new way. And most of the painters here don't want 'pretty' landscapes to paint because they don't want to paint 'pretty' pictures. There is going to be some development. The point is to control it."

Still, Weymouth admits that he would not be at all happy to have parts of the valley—say the King Ranch area—turned into a public park and "overrun" by thousands of weekend picnickers. His position is perhaps not unreasonable, considering the beauty and fragility of the landscape.

And it remains uncertain whether there will be many new painters to continue the Brandywine artistic tradition. There are younger artists—Jamie Wyeth and his friend Jimmy Lynch, sculptors André Harvey and Charles Parks—but the area seems to look backward rather than forward in art.

"We are constantly getting kids coming in on the bus," Weymouth says, "looking to be the next Andrew Wyeth, and of course they misunderstand what he is



Old steam plant, built around 1884 to provide power for powder yards, is now on the Hagley Museum grounds.

Kuerner farm (below) and its owners served as subjects for Andrew Wyeth for more than 40 years.

all about. What do we do? We encourage them to go home and paint—like Wyeth—the land they know the best."

The richness of the land depicted in Wyeth's paintings makes it easy to believe that the Brandywine region was one of America's earliest breadbaskets. From its construction around 1864 until the 1940s, Hoffman's mill had turned out the prized local flour. But the same waterpower that ground the area's grain also made it one of the nation's first centers of industry, an enclave of 19th-century high technology, the Silicon Valley of its time. The Brandywine powered nearly 150 mills for making paper, textiles, iron and finally the gunpowder of the du Ponts.

Many of the mills still stand. Andrew Wyeth's property contains a usable gristmill—the family house is the old miller's residence, the granary is a storehouse.

The du Pont powder mills were built with three stone walls and one of wood, to vent the blast and allow for more rapid rebuilding in the not infrequent case of explosion. The wooden side faced the creek, to protect adjacent mills from a chain reaction. "Going across the creek" meant being killed or injured in a blast. A piece of metal would slip between the stone rollers crushing material for the powder, and the spark of iron on stone would set it off. (You can see examples of such mills at the Hagley Museum near Wilmington.)

The sycamore—called buttonwood by locals—in the picture of Lafayette's quarters stands to this day. It is said to be the very tree against which Lafayette leaned in the aftermath of the struggle, presumably contemplating his wounds and the debacle of the day. The legends just might be right: the sycamore is a long-lived tree. In Wyeth's treatment its trunk swells with elemental power, the brown of its thick trunk and the silver of its upper limbs mediating between dark earth and bright sky. Despite the exactly observed bark and leaves still clinging to its twigs, it is as powerful as one of Mondrian's trees.

Revolutionary history in the air

The survival of that tree seems to many in the valley an emblem of the sense of history that attracted and inspired the area's artists. The Battle of the Brandywine flavored that air of history for good. For generations, wrote Henry Seidel Canby, one of the region's historians, local people dated things from that September day in 1777.

By modern standards, the engagement was a mere skirmish, but it was also very nearly disastrous for Washington's army. Landscape was a critical factor in the battle. Operating in ignorance of the topography of the region, George Washington failed to seal off a

The old: pre-Civil War building of the Laurel Iron Works is on land protected by the Conservancy.

The new: stairwell circled by cantilevered walkways is a part of the Brandywine museum's modern interior.

critical ford of the river that the British then used to mount a surprise flanking attack. The battle ended with the Continentals fleeing back toward Valley Forge and the hard winter that awaited them there, and with the British, under General Howe, moving to occupy Philadelphia.

It was the battle that drew artist Howard Pyle to the area in the 1890s. An illustrator in whose work history, distant lands and costume necessarily figured, Pyle loved the land for its history as much as for its hills and river.

N. C. Wyeth came here as one of Pyle's students. Wyeth's illustrations were for *The Last of the Mohicans, The Deerslayer, Treasure Island, The Mysterious Island, The Black Arrow,* all those Scribner's Illustrated Classics whose scenes—thick with adventure—are frozen in the memories of generations of children.

While N.C. projected the local landscape into exotic locales—using, for instance, his own house as the tavern in a pirate scene—his son Andrew projects moods and emotions aspiring to the universal into the local landscape so familiar to him.

This is true of *Trodden Weed* (1951), where a pair of costume boots, recalling his father's illustrations for *Treasure Island,* intrude on the brown-and-gray complexity of a fall field, and perhaps most famously of *Winter 1946,* where a boy runs across a looming and lonely hillside, suggestive of the grief and loneliness brought about by the death of the artist's father.

Feeling free in the land

A landscape must be familiar to the artist to serve this expressive function. "I feel limited if I travel," Wyeth once said, sounding like Thoreau. "I feel freer in surroundings that I don't have to be conscious of."

One evening not long ago, Wyeth stood as the quiet center of a knot of admirers at a party in the museum. The celebration was a double one. The museum was inaugurating an addition—a $3.6-million wing, sheathed in reflecting glass and lit with a special new system that uses filters, baffles and blinds to direct natural light evenly into the galleries—"its first use in a museum anywhere," says Conservancy and museum executive director James H. Duff proudly. Wyeth paintings from the Wyeths' own collection were the subject of the first exhibit.

The Conservancy, for its part, had just completed the preservation of a critical section of the Brandywine watershed. Now, amid the black-tied and gowned guests, among pumpkins and shocks of corn brought into the museum's courtyard, vast images of that landscape—projected slides at drive-in-movie scale—flashed over the heads of Wyeth and other guests: lush misty meadows, rolling hills, lines of willows thirstily fol-

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lowing a stream, ironweed and joe pye weed clustering about the ruins of thick stone buildings. It was as close as you can get to moving a landscape indoors, into a museum.

The land in question—5,367 acres—had belonged to the King Ranch, the huge Texas cattle operation. Cattle from the ranch were brought here to be fattened for the Northern markets. But the economics of cattle raising had changed; the land itself was on the market. The question was whether it would go to one of the developers who have dropped dozen-house patches around the edges of the valley for Philadelphia or Wilmington commuters, or to the Conservancy. Such development would not only have marred its beauty, but endangered its role in supplying clean drinking water to downstream Wilmington. That role had been recognized as early as 1919 by Lammot du Pont, it is recalled, when he began to assemble the parcel for Wilmington's future water supply.

The final plan, as put together under the leadership of Bill Sellers, created a limited partnership. The partnership donated the central, wild patch of land, 800 acres called the Laurels after its predominant flora, to the Conservancy. The partnership has placed the conservation easement restriction—legal promise of preservation—with the Conservancy. The rest of the land has been divided into parcels and will be distributed to the partners or sold to other purchasers. No more than three houses—old or new—will be allowed to stand on each 100 acres.

There is also an art to such preservation, and Sellers and his staff had put their souls into working out the complex $12-million deal. At one point, Sellers says, he had "five law firms working for me and 25 calling me." He spreads out a map of the parcels of the land involved, a series of fields arrayed like the fieldstones in one of the local farmhouses. "This area," he says, "is the key to the whole Brandywine watershed. It collects roughly half the water flowing into the west branch of the Brandywine. If it had gone, then the area would have gone. You would have had septic tanks, lawn chemicals, erosion, the works."

The keystone to this key area is the Laurels. Filled with the greenery that gives it its name and frequented by birders and other naturalists, it is also the location of a onetime iron furnace, whose plates and beams, it is believed, went into the Civil War ironclad warship, the *Monitor.*

At the top of the hills there, where black vultures and crows reel overhead, is the shell of a stone house. It was built by the owner of the iron forge, the aptly named Mr. Steele, for the schoolmaster he hired to teach his own and the employees' children.

Now, huge swallowtail butterflies pick their way among the wild flowers, skim alongside the zigzag shadows of lost stairs inside the ruin, swoop over the vines curling their way into the shell and finally settle on the weeds growing in the former parlor. Soon, the old house may be restored, but for now it remains a sort of offering to nature. Here, as in the valley at large, Man and nature seem to be moving toward a delicately balanced compromise, a cooperation artfully built, piece by piece, stone by stone, like the old house itself.

Artist Jamie Wyeth, Andrew's son, also captures the local scene. He has painted, and admires, pigs.

Remarkably elegant restored stone barn dates from 1820 and is still home to livestock, including Mork.

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have much to say about creature comforts?

the Turbo's list price of $18,150.*

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If you'd like to read more about the Peugeot 505 Turbo, call 1-800-447-2882 in the continental U.S. for a brochure and the name of your nearest Peugeot dealer.

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By Nancy Shute

NASM has a jump on forest fires for its new exhibit

A film made by a 25-year-old smokejumper is the high point of 'Aerial Firefighting' show

Linda Reimers spent the summer of 1983 waiting for Montana to catch fire. As director of *Fireflight*, a five-minute film on aerial firefighting for an exhibit that has recently opened in the Smithsonian's National Air and Space Museum, Reimers needed lots of shots of people battling forest fires: smokejumpers parachuting into the wilderness, lead planes guiding air tankers around pillars of smoke to drop chemical retardant, helicopters scooping water from high mountain lakes. Catching the action would be a long summer's work.

The 25-year-old independent filmmaker had a further interest in a "good" fire season: 1983 was her first year as a smokejumper for the U.S. Forest Service. As one of the first women to enter a difficult and dangerous profession, Reimers had to prove to her male coworkers and herself that she could take the heat.

As the only filmmaker among the 120 smokejumpers based at the Forest Service's Aerial Fire Depot in Missoula, the nation's oldest and largest smokejumper base, Reimers found that simultaneously recording history and making it was a less than simple proposition. "Being a rookie and doing the film and trying to be as inconspicuous as possible was difficult. That's all you want to do as a rookie, just blend in."

Fatigued and sooted after hours of digging trenches on a fire line, smokejumper and filmmaker Linda Reimers takes a breather.

This is an unusual group to blend into. Smokejumpers take a certain perverse pride in being the most iconoclastic collection of employees ever to find sanctuary within the musty labyrinth of the federal government. During the past 40 years, enough doctors, professors, plumbers, rakes, visionaries and free spirits have passed through their ranks to populate a small town.

The Forest Service uses the talents of the jumpers during the long hours spent waiting for fires. Need to research a museum-quality movie? Look in the ranks for John Harper, a 15-year smokejumper, historian and aspiring novelist. James Kautz, a former smokejumper, was borrowed from the Forest Service's Equipment Development Center to serve as *Fireflight*'s cinematographer. Reimers was detailed to write the shooting script and direct.

Photographs by James Balog

Last summer, when she wasn't jumping on a fire herself or directing the shooting for the NASM film, Reimers edited footage in a basement workshop.

Reimers hadn't set out to be either a filmmaker or a feminist symbol. In 1978 she left home in Brookings, South Dakota, for Montana State University, certain only that she wanted to get in a lot of skiing. Confused about her future, she dropped out her sophomore year and went to work for the Young Adult Conservation Corps; 1979 proved to be a big fire year, and Reimers was pressed into service on a pickup fire crew. As a "groundpounder" she spent hours on end grubbing out an 18-inch-wide line in the dirt with a pulaski, a combination ax and hoe, to rob the advancing fire of fuel.

After three more summers on fire crews and a return to school to major in filmmaking, she decided to apply for smokejumper training. Why Linda Reimers, or anyone else, would want to be a smokejumper is open to reasonable doubt. The job lasts for only three months out of the year. The pay is hardly exorbitant: in a good season a jumper stands to clear no more than $6,000.

Conditions aren't cushy. At the base, jumpers are lucky if they can get government housing. On a fire, accommodations end at government-issue sleeping bags thrown wherever the ground is cool, freeze-dried chicken à la king, and stale water air-dropped in plastic cubes. The only difference in firefighting technique between the smokejumpers and the lowly groundpounders is the delivery system: 1,200 heart-stopping feet straight down from the door of the de Havilland Twin Otter to the granite-studded mountainside.

The fraternity of smokejumpers had a shaky beginning. The Forest Service had been using airplanes to detect fires since 1919, when leftover Army Air Service Curtiss JN-4D aircraft and pilots were pressed into service to fly fire patrols, tying notes to the legs of carrier pigeons or dropping information in tin cans.

The idea of dropping men out of airplanes, however, was met with less than enthusiasm. In 1935 Evan Kelley, regional forester in Montana, wrote back to Washington requesting that any further experiments on this scheme be moved beyond his purview. Complained Kelley: "All parachute jumpers are more or less crazy —just a little bit unbalanced, otherwise they wouldn't be engaged in such a hazardous undertaking."

Despite Kelley's qualms, in 1939 professional parachutists survived test jumps into rough mountain terrain. In 1941 the first smokejumper training base was established at Missoula, and the jumpers quickly proved themselves to be both more effective and more economical in fighting remote backcountry fires than ground-based fire crews. Their success drew the attention of another operation of Uncle Sam's: four U.S. Army staff officers visited the Missoula base and took their notes back to Fort Benning, Georgia, where they launched the 101st Airborne Division and trained paratroopers for what would become the Normandy invasion. During World War II, conscientious objectors filled the slots.

Today's jumpers are older—average age 27—and more experienced than those of years past. One-third look on jumping as a stepping-stone to a Forest Service career. Others return year after year, daunted by the continued depression in the Western job market or addicted to the pure adrenaline produced by combining airplanes and fires.

In 1981, the Forest Service finally allowed women to join the smokejumper ranks (the first to qualify was Deanne Shulman of Santa Monica, California); today, Reimers is one of five women among the 120 Missoula jumpers. Mary Barr, National Aviation Safety Officer for the Forest Service, says that the Service in general, and Service aviation in particular, is still almost a closed club, particularly for young women like Reimers. "It's a macho outfit. Slowly but surely we females are breaking down the barrier."

Mary Barr should know. In 1974, at the age of 49, Barr became the Forest Service's first female lead-plane pilot, thereby earning her photograph a place of honor in the Air and Space Museum. Now 59, gray-haired

The author wrote about cartoonist Gary Larson in the April 1984 issue.

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At smokejumper training ground, Linda climbs pole with help of spurs on feet.

Linda takes a practice jump from 1,200 feet over Montana. For small forest fires, only two smokejumpers are parachuted from a Cessna.

and a widow, Barr has forsaken stick-and-rudder work for a desk job in Washington, but she hasn't forgotten the thrill of her years of flying lead planes, directing the air-tanker operations over big fires. "You don't concentrate on the flying. You're out there fighting fire. You're right down in it, 100 feet or so off the ground with these big heavy air tankers behind you. It's turbulent, it's rough and hot. You get into a lot of tight corners, but when you get out you don't think it's so bad."

Reimers' trial by fire began in May 1982, when she came to the Missoula base for three weeks of rookie smokejumper training. As an athletic woman who practically grew up on the local golf course and went out for track and basketball in high school, she wasn't expecting to have too much trouble with the required strength test of seven pull-ups, 25 push-ups, 45 sit-ups and a mile-and-a-half run under 11 minutes.

On the first day, Reimers failed the pull-ups. On the second afternoon, the rookies were bused into the mountains to Howard Creek and set to digging a fire line around an imaginary fire. They dug through the night. At 6:30 in the morning, they packed their pulaskis and saws into 90-pound packs and headed down the three-mile trail. Halfway back, Reimers dropped her pack on the ground and said to herself, "I shouldn't be here." She had just washed out of smokejumping.

She didn't plan to fail again. Reimers rejoined the groundpounders that summer and began training for next year's test—running, lifting weights, hiking with a pack.

In April, a man from the Forest Service called. There wouldn't be any rookie class at Missoula. But in order to encourage women and minorities, they would allow those who washed out last year to train at the Redding, California, base. Was she interested? Reimers decided that the disadvantage of getting in under a special dispensation was outweighed by the chance to succeed where she had failed before. She had more than her pride at stake, however. That winter, John Harper had asked her to write a script for the

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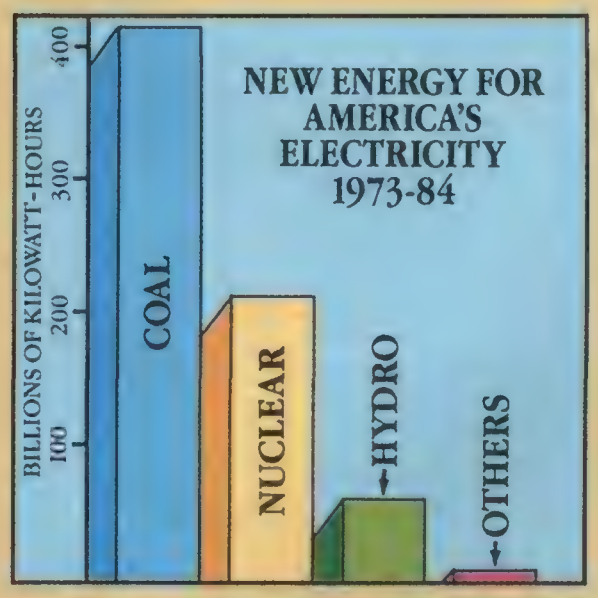

Coal and nuclear energy have provided over 90% of all the new electricity added to our energy supply since 1973. This has enabled utilities to reduce their consumption of more costly oil and natural gas. Source: Energy Information Administration/U.S. Dept. of Energy.

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Air and Space Museum exhibit film. If she made jumper, she could direct the film as well. This time she passed the physical tests.

The three-week training period started at 7 A.M. with five hours of simulated parachuting from jump towers and static wires. Reimers didn't think the jump and roll into the sawdust was too bad, but actually jumping out of an airplane and hitting the cleared jump spot instead of hanging up in the trees was another matter altogether—but she learned.

As a full-fledged smokejumper, Reimers made her first two jumps above the Arctic Circle in Alaska, into treeless tundra as forgiving to a novice parachutist as a trampoline. Then it was back to Missoula where she and Kautz divided their time between fighting fires and filming.

Reimers and Kautz shot film until the snows of October snuffed out the last of the fires. During the winter Reimers edited the film in a basement studio in downtown Missoula and went to Washington to work with curators at the Air and Space Museum.

If the summer of 1983 had produced too little fire for either filming or fighting, the 1984 fire season delivered too much. In late August, dozens of fires sparked by lightning flared across Montana from the Rockies to the eastern grasslands. Like the rest of the jumpers, Reimers alternated between days of waiting and intensive firefighting. She spent three days on one of the major fires, Napi Peak, near Glacier National Park, before being called back into reserve. "Filming is a lot like fighting fires," she says. "When you go, you go like crazy."

As the end of the 1984 season approached, Reimers was finishing up with details. After a hectic week recording odd bits of sound that she couldn't reproduce in the studio—the chink of pulaskis hitting stone, the jingle and swish of a smokejumper climbing a tree to retrieve a parachute—she shipped the film off to Washington.

Visitors to the exhibit on the main floor of the Air and Space Museum, if they look very closely, can catch a glimpse of the filmmaker herself, memorialized by one career while performing the other. "I'm in the film once," Reimers explains. "I'm the second man—the second person—out of the plane." She smiles apologetically, noting that, with the jump gear on, you really can't tell that the second man is not a man at all.

After jumping into a clearing and packing up her parachute, Reimers gets to work, here wielding a pulaski to break up a smouldering log.

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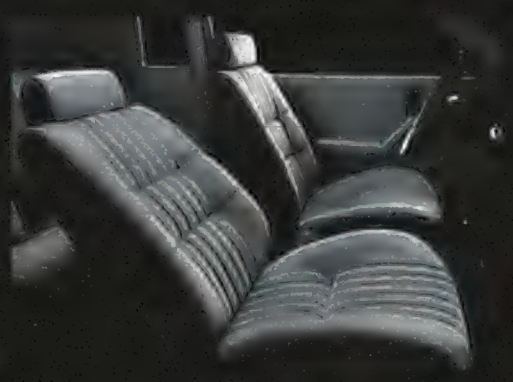

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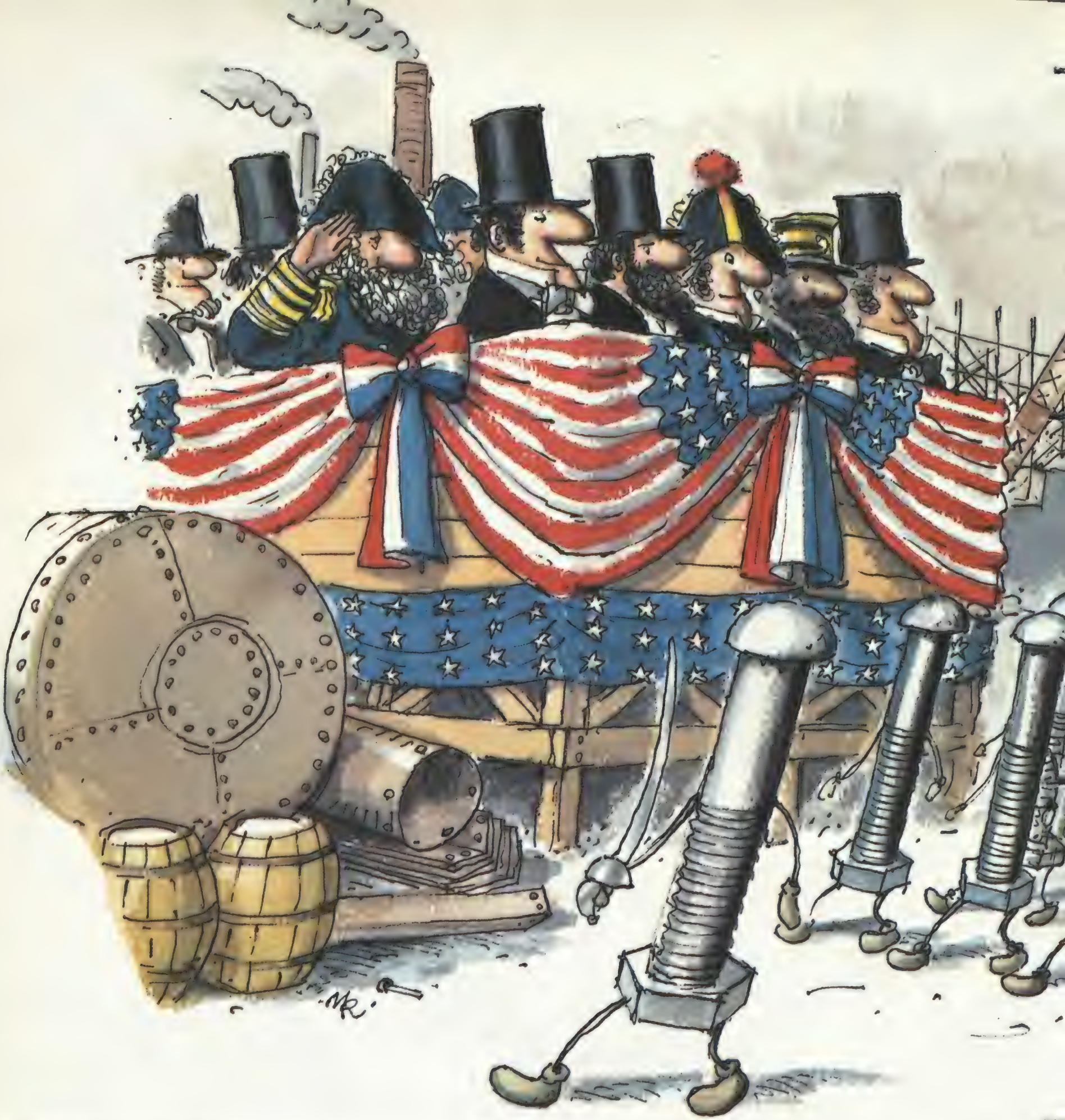
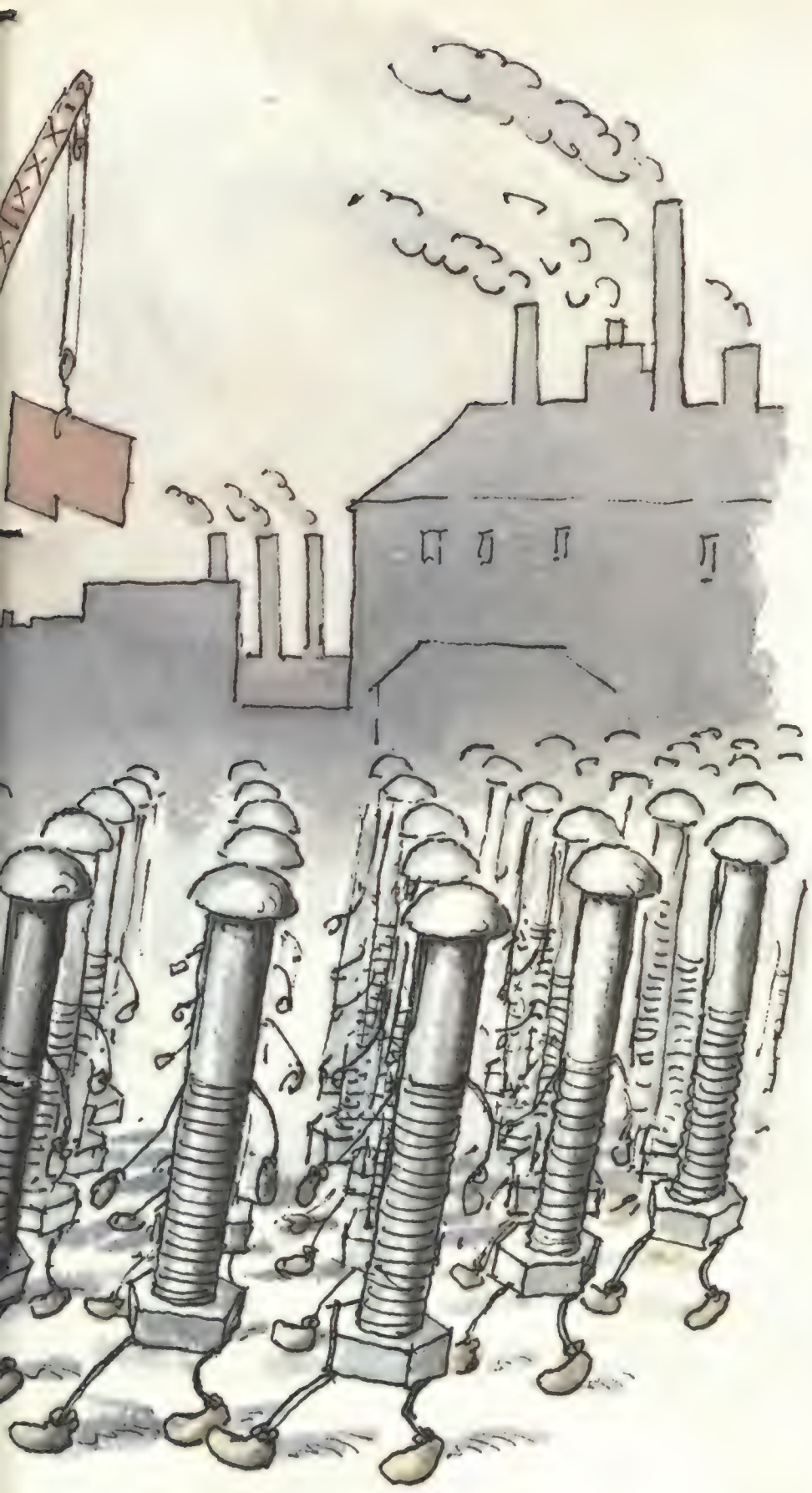


By Achsah Nesmith

A long, arduous march toward standardization

From our screw threads and fire hydrants to railroad track and the metric system, most standards proved very hard to come by



In 1863 the Secretary of the Navy managed to fix the gauge for all bolts, nuts and screw threads.

The Sandersville Railroad was built in the 1890s by citizens who wanted to link their central Georgia town with neighboring Tennille, three miles away, and by way of Tennille's main-line railroad, with the world. When the little railroad came on hard times in 1916, the surviving owners turned to an up-and-coming young man named Ben J. Tarbutton and made him an offer. If he could restore its profitability, ensuring the town continued service, he could buy the railroad at a reasonable price. Tarbutton had no railroad experience, but he was single and eager to move around, so he agreed to try.

Soon he had put the Sandersville back in the black, cheerfully tooting between the two towns with three round trips a day, and the railroad was his. As its president, he eagerly wrote the president of the Pennsylvania Railroad offering to exchange passes, a common practice among railroad officials in that day. The Northerner refused, noting acidly that the Pennsylvania had thousands of miles of track connecting major cities while all three miles of Sandersville track were within Washington County. "It is true that my railroad may not be as long as yours," Tarbutton is said to have replied, "but it, sir, is just as wide."

Switching tracks, but not the trains

Tarbutton's sons, Ben jr. and Hugh, still run the profitable little railroad. The fact that it was and still is the same width as the Pennsylvania came about through one of the most dramatic instances of mass standardization that ever took place. During two spring days in 1886, the rails were moved on more than 11,000 miles of track stretching from Virginia to Florida and Texas. When the great shift was over, trains could travel from the South to the North or the West without much of the time-consuming transfers of passengers and changing of wheels at connecting points that had gone on before. By Wednesday morning, June 2, 1886, the South's rails at last matched the gauge used by the mighty Pennsylvania.

In 1985, when every drug and stationery store sells standard notebook paper to fit your child's notebook, light bulbs to fit your lamp and film to fit your camera, it is hard to imagine what things were like when almost nothing was "standardized" except some of the most basic weights and measures, and even a number of those were inexact.

In 1789, the Constitution charged Congress with fixing standard weights and measures. In his first annual address President Washington urged action. So did Thomas Jefferson, who advocated an elaborate decimal measuring system based on the length of a swinging bar whose period was two seconds. But it was not until December 1819 that Congress ordered a study of the question and Secretary of State John Quincy Adams was asked to look into the matter. Early in 1821, Adams produced a book-length report that became a classic on the subject—but it did not move Congress to act.

Adams admired the metric system extravagantly, but instead of recommending it, he concentrated on measurements accessible to the average man, aiming at least to bring workable standards of measure to Ameri-

Illustrations by Mike Ramus

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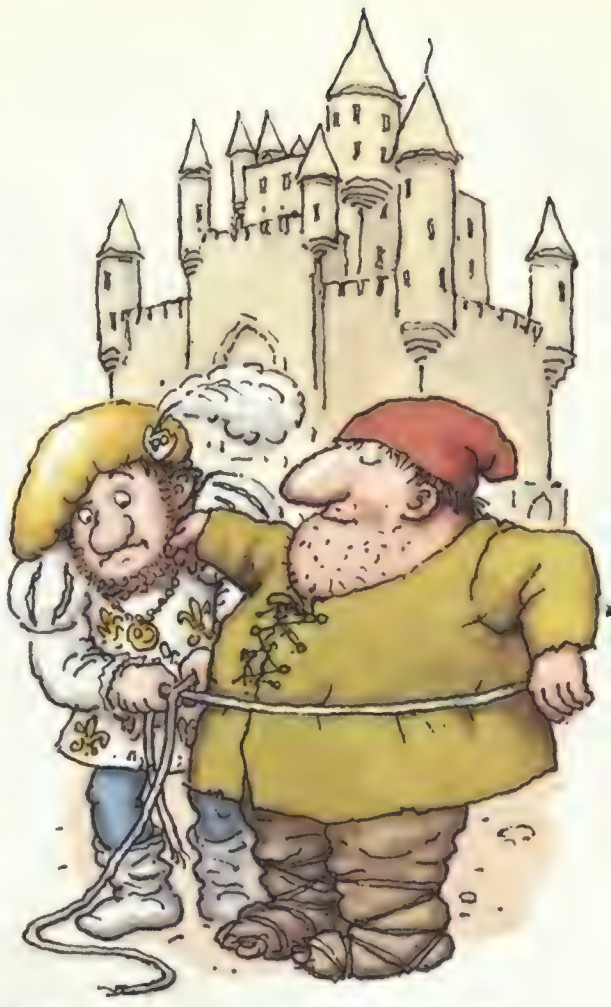
can customhouses where weights and measures continued to vary disconcertingly. "The avoirdupois pound of Alexandria," he reported, "is one of the most defective in the Union . . . and the half bushel is too small," by 16 cubic inches. Adams also complained about the "New York yard" because it was "too short." Since the national government depended on tariffs collected at customhouses, the problem was indeed serious.

Serious, but not new. Adams' study pointed out that "from the earliest records of Parliamentary history," English statutes were "filled with ineffectual attempts of the legislature to establish uniformity." Since ancient times, too, prophets and potentates had dreamed that uniform weights and measures would produce justice, order, sound economy and good government, but the road to standardization was always a hard one to travel. The Hebrew historian Josephus credits Cain, the first tiller of the soil (as well as the first murderer), with inventing measures. Even in ancient times, falsification of weights and measures was not uncommon. One Hebrew proverb proclaimed that "divers weights are an abomination to the Lord."

"Man is the measure of all things," the Greek philosopher Protagoras wrote, and indeed, for a time, he very nearly was. The cubit, widely used throughout the ancient world, was originally based on the length of a man's forearm (the Egyptian hieroglyph for a cubit was a forearm) but the exact measure varied enormously. Egypt, for instance, had both the cubit of the man (17.72 inches) and the cubit of the king (20.62 inches). Still, measurements for such structures as the Great Pyramid of Giza turned out to be remarkably accurate.

John Adams considered it an important innovation when the Greeks

The author, a Washington, D.C., free-lancer, served on President Carter's staff as a speech writer.



A Saxon yard (highly variable) was based on average girth of an Englishman.

introduced a standard foot—based on Hercules' foot, the story goes. The Romans added a mile made up of 1,000 paces. In England, the Saxon yard supposedly was based on the girth of a man, but Henry I found the measure so variable that he decreed a yard would henceforth equal the length of his own arm.

Along with rights for nobles, the Magna Carta called for "one measure for ale, one measure for wine, one measure for corn." But, in 1496, Henry VII thought that meant equating dry and liquid measures and his attempts at standardization added new levels of confusion. Many common measures grew up within the trades—land measured in rods, horses in hands, diamonds in carats (from the weight of a single carob seed), cloth in yards, printer's type in points—and none of them related to the others. Well into the 19th century, Adams found, Britain's system of weights and measures was "in ruins."

But a decade after Adams exhaustively documented the discrepancies

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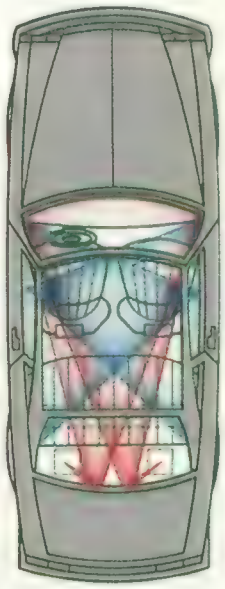

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existing in America's weights and measures, nothing had been done. Finally, in 1830, a Swiss-born metrologist named Ferdinand Hassler was hired to study the matter again. Brilliant, irascible, dedicated to scientific accuracy, Hassler was quite oblivious to political practicalities or everyday economic necessities. He based the national standard of length on an 82-inch bar fashioned by the English instrument maker Edward Troughton. He fixed the official yard at the interval between the 27- and 63-inch marks, or 36 inches.

When Hassler sent for the weights and measures being used by all the customhouses around the country, many reported back that they had none. He thereupon established the standards himself, ordering duplicates made for each state and every customhouse in America.

Hassler had been authorized only to report on the country's weights-and-measures problem, but Congress was so impressed by his zeal that it approved his unilateral actions after the fact. Yet when Hassler died in 1834, after trying to protect his precious surveying instruments in a storm, only a third of the states were using standardized measures of length. The last official standard measures in some states were not established until 1856.

By then, the rise of industrialization had created a need for new types of standards that neither Protagoras nor King Henry could possibly have imagined. If machines were to produce efficiently, all parts needed to be exactly interchangeable. During the Civil War, standard sizes in men's ready-made clothing were introduced to solve the problem of putting masses of men into uniform. In 1863, the Secretary of the Navy managed to set a standard gauge for diameters of bolts, nuts and screw threads—though only for use in Navy yards.

The great day in 1886 when Southern rails were uniformly moved to conform to the narrower gauge of the Pennsylvania was a delayed Civil War victory for the North. One of the first railroads in the country, the South Carolina, which ran from Charleston to Hamburg, had 136 miles of track by 1833. That made it the longest railroad in the world. It was originally built to a 5-foot gauge and railroad builders all over the South followed suit. Meanwhile, in the North, the majority of railroad tracks were built to a "standard" width which actually ranged from 4 feet 8½ inches to 4 feet 10 inches, but some tracks were even wider than that. The Erie, for example, stretched a full 6 feet between the rails.

One of the first serious efforts to

At one point, gangs of women in Erie, Pennsylvania, began tearing up rails to frustrate government attempts at standardizing the width of track.

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bring uniformity to Northern rail gauges in 1853 resulted in bloody riots in places like Erie, Pennsylvania. As a junction point where three different widths of railroad met, Erie citizens stood to lose hundreds of jobs created by the need to load and unload, as well as jack up, all the arriving cars in order to change their wheels. With so much well-paid work to lose, city officials refused to grant the railroads the right to close streets and bridges while the track-width changes were made, and the governor of Pennsylvania backed them. Families and even church congregations split into factions over the issue. At one point, a mob of women took sledgehammers and were tearing up the various tracks until federal marshals moved in.

In fact, there was no overwhelming practical reason for the adoption of the 4-foot 8½-inch gauge in North America. (Some early locomotives, imported from Britain, had been built to travel the 4-foot 8½-inch gauge established by Parliament.) The balance was probably tipped in favor of the narrower gauge by President Lincoln's call, in 1862, for a railroad to link the nation from sea to sea. The resulting road was known as the Union Pacific; legislation enacted in 1864 specified a "standard" 4-foot 8½-inch gauge track.

By 1886 that gauge, along with 4-foot 9-inch track, dominated the nation, in part because rolling stock could be used more or less interchangeably on both. By then, too, the cost of changing wheels and reloading cars weighed heavily on Southern railroads. Early in 1886 they agreed to convert and chose the Pennsylvania's 4-foot 9-inch width.

When the day came for moving the rails, crews set out across the South at 3:30 A.M. on Monday, May 31. Passenger trains were placed on special schedules and shippers notified that freight deliveries would be delayed. Georgia had the most track, with 2,413 miles, but according to the

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When the number of boiler explosions reached 1,400 a year, in 1910, American engineers established safety standards that all but eliminated the problem.

Savannah News everything went so smoothly that passengers were barely aware of the great rail shift.

The railroads standardized time simply by agreeing to change their clocks (SMITHSONIAN, November 1983). No legislation was required. A standard time and standardized track were profitable to the companies involved. But setting reasonable standards for safety to the public was a thornier and more costly question.

In the latter part of the 19th century, an epidemic of boiler explosions accompanied the spread of steam power. In 1865 the Mississippi riverboat *Sultana* exploded, killing 1,450 Union soldiers just released from Confederate prisons. In 1894, at the Henry Clay Mine in Shamokin, Pennsylvania, 27 boilers exploded simultaneously, leveling the sur-

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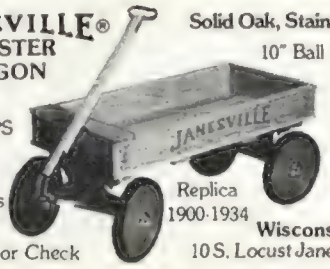

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rounding town and killing thousands of people. During the period from 1870 to 1910, at least 10,000 boiler explosions were recorded in the United States and adjoining areas of Canada and Mexico. In 1910, with explosions totaling 1,400 a year, the American Society of Mechanical Engineers got together to write a comprehensive boiler code. Quickly adopted by most states and cities, it virtually eliminated explosions.

As science and technology advanced, the need for additional standards became ever more apparent. In 1894, a system of standard values for basic units of electricity—including the farad (capacity), the ohm (resistance) and the watt (power) was worked out. By 1901, the National Bureau of Standards was in place (SMITHSONIAN, September and October 1978). It took the great Baltimore fire of 1904, though, to further underscore the need for product standards.

On Sunday, February 7, at 10:40 A.M., an automatic fire alarm went off in the basement of Baltimore's John E. Hurst wholesale dry-goods warehouse. Within ten minutes an explosion spread the fire to neighboring buildings. Borne by the wind, the flames spread through the central business district. Wooden stables and sheds dotted the alleys between "completely fireproof" buildings of steel-reinforced concrete, stone and brick. Once the fire was out of control, the heat became so intense that masonry structures seemed to burst into spontaneous flames. By 11:40 A.M. the fire department's chief engineer, George W. Horton, sent a telegram to Washington: "Desperate fire here. Must have help at once." By 12:47 the first firemen and engines had been loaded onto a special train in Washington and made the trip in almost record time, 38 minutes. Baltimore crowds cheered, but the rescuing firemen soon found that their hoses would not fit the Baltimore hydrants. They wrapped them to the plugs with improvised canvas "bandages," but the

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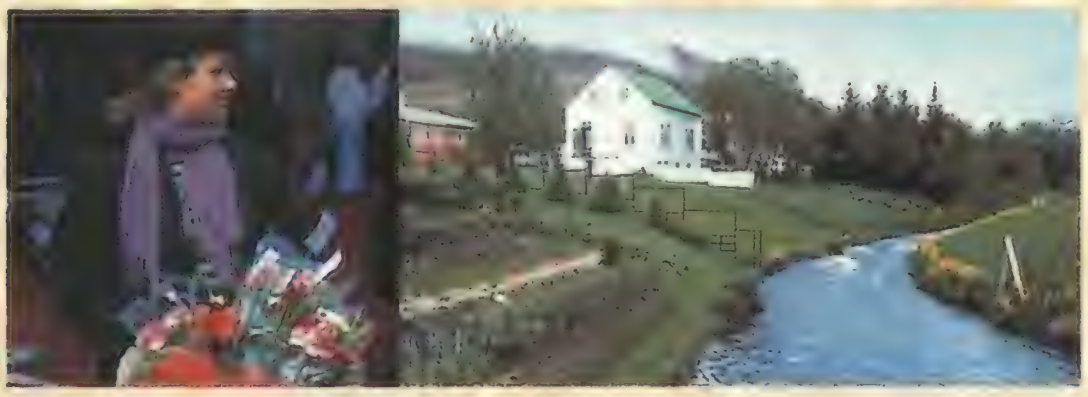

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streams of water were so weak the men had to hold nozzles dangerously close to the flames.

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companies had burned down, along with the brokerage houses and most retail and wholesale businesses.

Ironically, in October of the same year, shortly after the Bureau of Standards opened new laboratories in the nation's capital, a fire broke out in dry leaves near the building. Night watchman Franklin Durston gathered up all the hose he could find, but the threads of the Bureau of Standards' own hoses did not match and he could get no water to the blaze. He succeeded in stamping out the fire, but the lesson of Baltimore had been dramatically reinforced. Bureau investigators soon found that 600 different sizes and varieties of hose couplings were then being used in the United States.

By 1905 national standards for fire hoses were adopted but laws were not quickly put into effect. In October 1964, 60 years after the Baltimore fire, the city learned that firemen in an adjoining county were requesting that fireplugs which did not fit hoses made to the national standard be marked with fluorescent paint so firefighters could tell where special adapters were needed.

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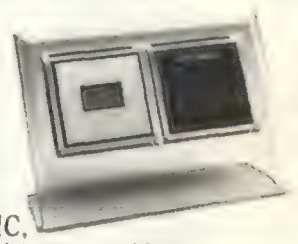

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Inevitably, the early 20th century brought a general rush to establish safety standards for everything from the strength of elevator cables to safety levels for gas appliances. In the winter of 1922-23, carbon-monoxide poisoning caused 42 deaths in Baltimore. The gas-appliance industry kept blaming the deaths on suicides, but once the standards took effect on gas appliances, carbon-monoxide deaths dropped dramatically to one or two a year.

Mobilization for war always brings a push for standardization to increase efficiency and save scarce materials. In World War I, scarcity changed fashions dramatically—almost overnight the shortage of leather did away with high-button shoes, and the shortage of steel resulted in a type of corset that let women breathe freely. Simplified standards reduced labor costs by 35 percent and the costs of some materials were cut in half.

In World War II, government standard setters continued their own battle against inefficiency and waste by devising a series of design and performance standards that made possible the development of synthetic rubber and new alloys. They also developed quality-control tests for synthetics and saved tons of copper and nickel with new standards for the Government Printing Office.

Some of the work was regarded with suspicion. Early in 1945, for instance, it was discovered that while the hard-pressed nation was at war, Bureau of Standards Director Lyman J. Briggs was conducting a study of the bounce characteristics of baseballs. Briggs explained that he had only analyzed the results—a high school boy had done the experiments. The rubber shortage was acute (gas rationing had been instituted partly to save rubber) and the manufacture of standard baseballs had been prohibited because their cork centers were cushioned in rubber. The experiments were supposed to determine whether new cork-center balls with-

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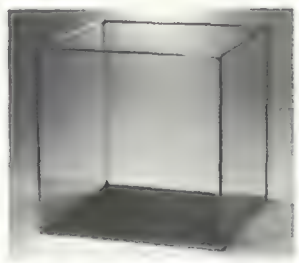

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out the rubber cushioning were a satisfactory substitute. Briggs learned that a hard-hit experimental ball tended to drop 30 feet shorter than the old rubber-cushioned balls.

Today, when a few parts per million can determine matters of life and death around the world, standard setters are under enormous pressure to achieve uniformity at greater precision than ever before. The tiniest microdeviation from perfect tolerances can make space ships go off course and airplanes malfunction.

The latest edition of boiler standards, published in July 1983, runs to 8,500 pages. Altogether, more than 25,000 items are covered by national standards of one kind or another, from movie seats and two-by-fours to television systems. The United States standardized its color-TV transmissions in 1953. Europe set its color standards in the 1960s—employing a technology which some viewers argue produces a better picture.

The foundation of all modern measurement is an international system based on seven basic standards. These are the standards which define the modern metric system. They are:

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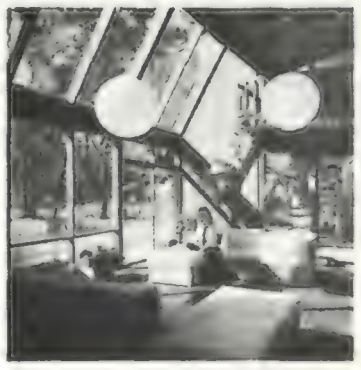

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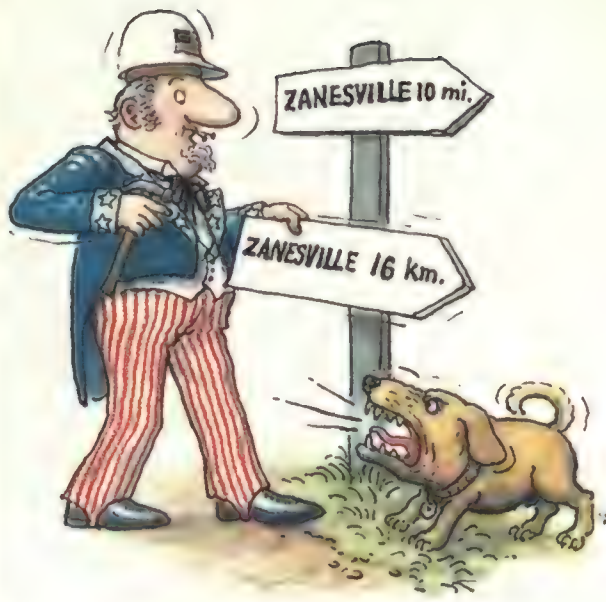

By and large, Americans have stoutly resisted switching to the metric system.

the kilogram (mass), the meter (length), the second (time), the ampere (electric current), the kelvin (temperature), the mole (chemical substance) and the candela (light). The kilogram is based on an actual physical object. The other standards are based on natural phenomena, i.e., formulas that can be reproduced in laboratories throughout the world because they are based on natural laws. In October 1983, the official international standard for the meter was changed to "the distance traveled by light in a vacuum during one-299,-792,458th of a second." The second is now defined as "the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium-133 atom." If that seems unhandy, it has a point in its favor—it is the most accurate measurement modern science has yet come up with.

Scientists in the National Bureau of Standards are currently trying to find a "natural" definition of the kilogram to replace Kilogram 20. That is the cylinder of platinum-iridium alloy which President Benjamin Harrison unpacked at a special ceremony in his office in 1890 after it had been shipped from France. Ever since then, this particular hunk of

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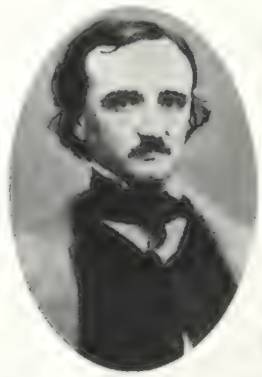

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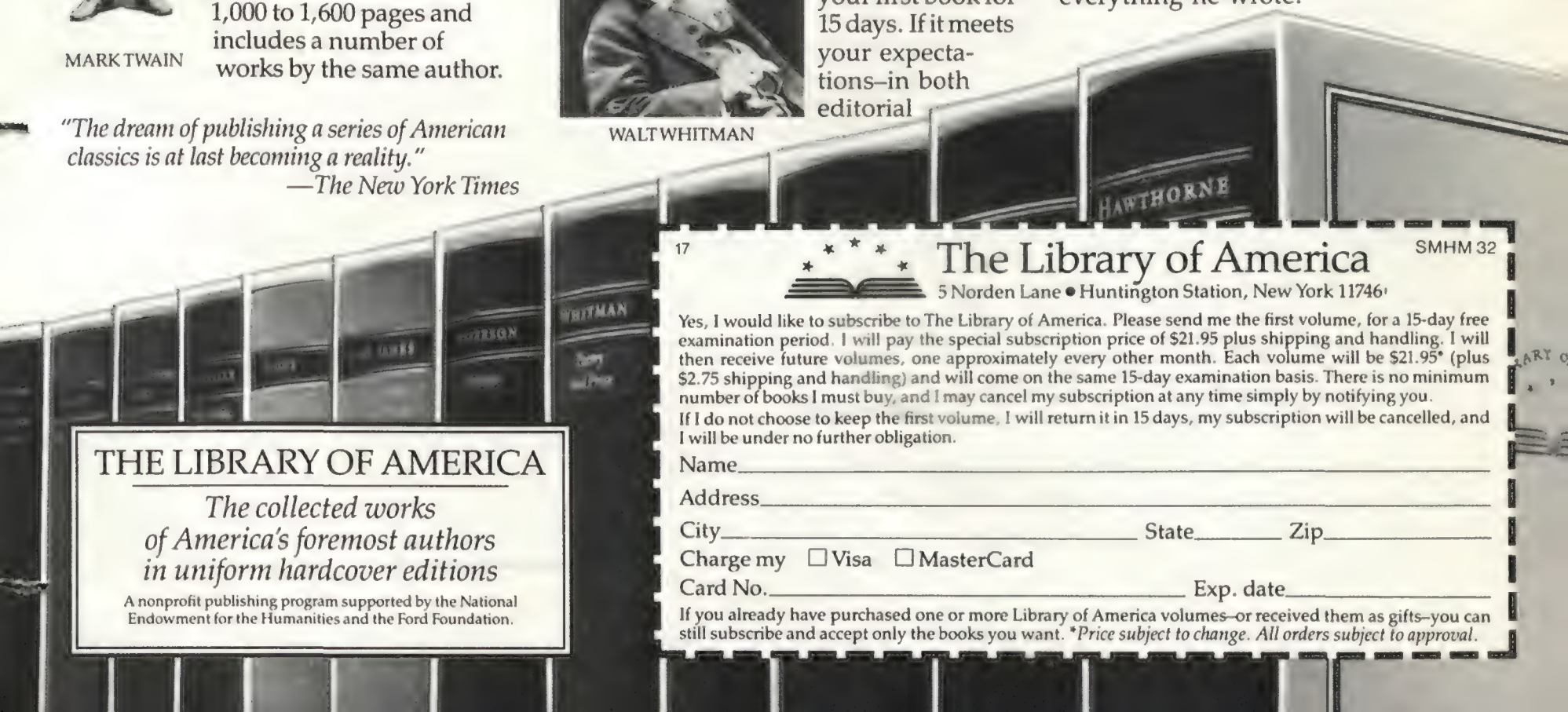

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The United States has two of the original 40 copies, Kilo 20 and Kilo 4. Kilo 20 is used only to calibrate "working" standards, which are then used for calibrating others, and Kilo 4 is used only for comparisons with Kilo 20. Under the provisions of the Treaty of the Meter, which was signed in France in 1875 by 21 countries, all of the copies were to be returned periodically to the International Bureau of Weights and Measures in Sèvres for comparisons. Wars intervened with shocking regularity, however, and Kilo 20 has been back to Paris only three times—in 1937, 1948 and 1983. Transported by a Bureau scientist carrying a special chamois-lined brass container—which under special international papers even customs officials are not allowed to open—Kilo 20 was accompanied by Kilo 4 for the first time in 1983. The crucial comparisons took months. Kilo 4 had not changed weight since 1890, Kilo 20 had changed by less than 20-billionths of a kilogram, an allowable magnitude of error, and so no changes in measurements resulted.

Back in 1821 John Quincy Adams believed that the metric system might usher in an era of peace and goodwill among men, but he did not think the American public would put up with the change. And how right he was. Metrics are now used by scientists and schoolchildren all over the world. They are widely accepted in manufacturing and international trade. But they have been only haltingly adopted in the United States. When service stations put in liter measurements for gasoline after the 1979 oil embargo brought prices above $1 per gallon, the public balked. The industry backed down.

Dr. John K. Taylor, a longtime Bureau of Standards employee, understands the average person's cantankerous affection for capricious pounds, yards and gallons. Still, like Adams, he holds to the ancient dream that proper standards promote justice, order and peace. "Problems are best solved when people can measure things by the same standards," he says quietly. Until that ideal can be realized on a higher level, we will just have to hold things together with standardized bolts—and hope.

From pre-Roman times many men have entertained a hopeful dream that standardization will promote goodwill, order and peace.

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Shown clockwise, starting upper left: Patton, Ludendorff, Sitting Bull, Rommel.

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Book reviews

Traditional American Folk Songs: From the Anne and Frank Warner Collection
Anne Warner
Syracuse University, $48/$25.95 paper

Frank and Anne Warner took their first ballad-hunting jaunt nearly a half-century ago—and what a team they were! Others, myself included, lugged primitive recording machines into impossible places in search of folk-song gold, but none matched the Warner magic in coaxing those "old-timey" songs out of a Cumberland Mountain grandmother or an Adirondack lumberjack. Carl Sandburg claimed it was because Frank never went to a music conservatory. Alan Lomax ascribes it to the Warners' "life-long love affair with the people who remembered the ballads." However, Frank Proffitt, a Blue Ridge mountaineer singer, summed it up best years ago when he wrote:

"Then Frank Warner came to the mountains, and in him I saw a addgicated person who made me feel like somebody and I open my heart to him and gave him the old songs of my people . . . he and Anne didn't seem to notice we was pore and didn't know big words. They bragged on our new calf, our little two room cabin, and brought store stuff for us all to eat. I walked on air for days. . . ."

Unless they have been desensitized by "folk rock" or modern hyped-up "country," I predict that others will "walk on air" as they browse through this galaxy of nearly 200 songs, and perhaps even sing them (the music scores are all there in "keys comfortable for the 'average' singer"). They will find pleasure also in Anne Warner's many casual photographs and transcripts of conversations with the singers, their families and neighbors. As for scholarship, the author knows enough about the "etiology," etc., of folk song to satisfy the most demanding folklorist. What she doesn't tell us about the tunes themselves—those fine "nuances of rhythm and decoration"—is expertly dealt with by musicologist Jerome S. Epstein in a brief prefatory essay. There is nothing intrusively academic, however, in this whole handsome book.

American folk song is, in part, a form of primitive journalism. A train is wrecked, a coal mine caves in, a murder is committed and, in lieu of the press, radio and television, the tale is passed on in song. It becomes timeless, or as though it had happened yesterday instead of a century ago. Here is "news" that people in remote areas could relate to.

Roby Hicks gave Warners songs, stories of mountain life in the "early days."

There are also, of course, rollicking "play party" songs for dancing, ditties about wild "critters," drunken sprees and jolly bachelors, laments for wayward lords and ladies in ancient times, spirituals from slavery days, and street cries from big cities. If one wonders why some old favorites are missing, it is because, as Anne announces firmly, "We didn't collect them—someone else did!" I wish others, especially some of those "pop" folk singers who borrowed such a Warner discovery as Frank Proffitt's "Tom Dooley," had given a token bow, at least, in the Warners' direction.

Frank never prettied up a folk song. If an incomprehensible phrase appeared he sang it as he heard it, though Anne will point out in a footnote what the original really was. He knew when to lay aside his banjo or his guitar and sing a cappella, for he realized how instrumental accompaniment can distort those nuances. I would advise those who try their voices on some of these songs to do the same.

Frank Warner died in 1978. He recorded many of his favorites for small companies like Elektra, and I hope that, with the advent of this book, they may be reissued so that we can hear it once again the way it was—"out yonder."

Charles Lafayette Todd
Chairman emeritus, Speech and Communications Department
Hamilton College, Clinton, New York

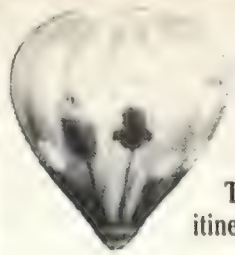
Journal, Volume 2: 1842-1848
The Writings of Henry D. Thoreau
Edited by Robert Sattelmeyer
Princeton University, $35

"A literal reproduction [of Thoreau's *Journal*] . . . may some day be of interest to antiquaries and special students; but such an edition could never be adapted . . . to the needs of those who read for pleasure and general profit." So noted Bradford Torrey and Francis Allen, editors of the first and until lately standard edition of the *Journals,* in introducing their work in 1906.

The pleasures of this *Journal,* for scholarship and general profit, prove Torrey and Allen wrong. A more thorough Thoreau *Journal* than this second volume in the Princeton *Journal* series (and seventh in their publication of Thoreau's writings) is beyond reason, if not imagining. Only a photocopy of Thoreau's cramped scrawl on pages torn (by the author) from the four long, marbled-board notebooks he filled during these productive years could give a fuller flavor of Thoreau's thoughts.

A team of nearly two-score researchers (and computer) captained by editor and University of Missouri, Columbia, associate professor Robert Sattelmeyer prepared this second volume, providing textual and historical notes, tables of alterations and hyphenations (Thoreau's), emendations (theirs, but only where brief passages were found "misleading or distracting") and cross-references (to Thoreau's works for publication). These are among the postscripts to 385 pages of Thoreau's own words, derived from four readings of photocopies of original manuscripts and checked three more times in galley form against transcripts. This is a prodigious work of scholarship that could well have driven dedicated men and women to quiet desperation.

The cause for elation on the part of readers of Thoreau is the restoration of what Torrey and Allen took away from the three then available *Journal* notebooks—and more (published here for the first time are the Berg Journal, principally a long draft of the essay "Ktaadn, and the Maine Woods," and 16 scattered leaves from a subsequent journal). What is restored is far more than the "tediously minute technical description" the earlier editors excised, but rather the bulk of Thoreau's writing during the half-decade



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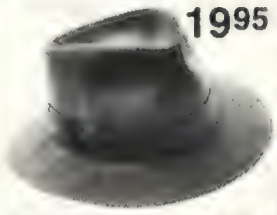

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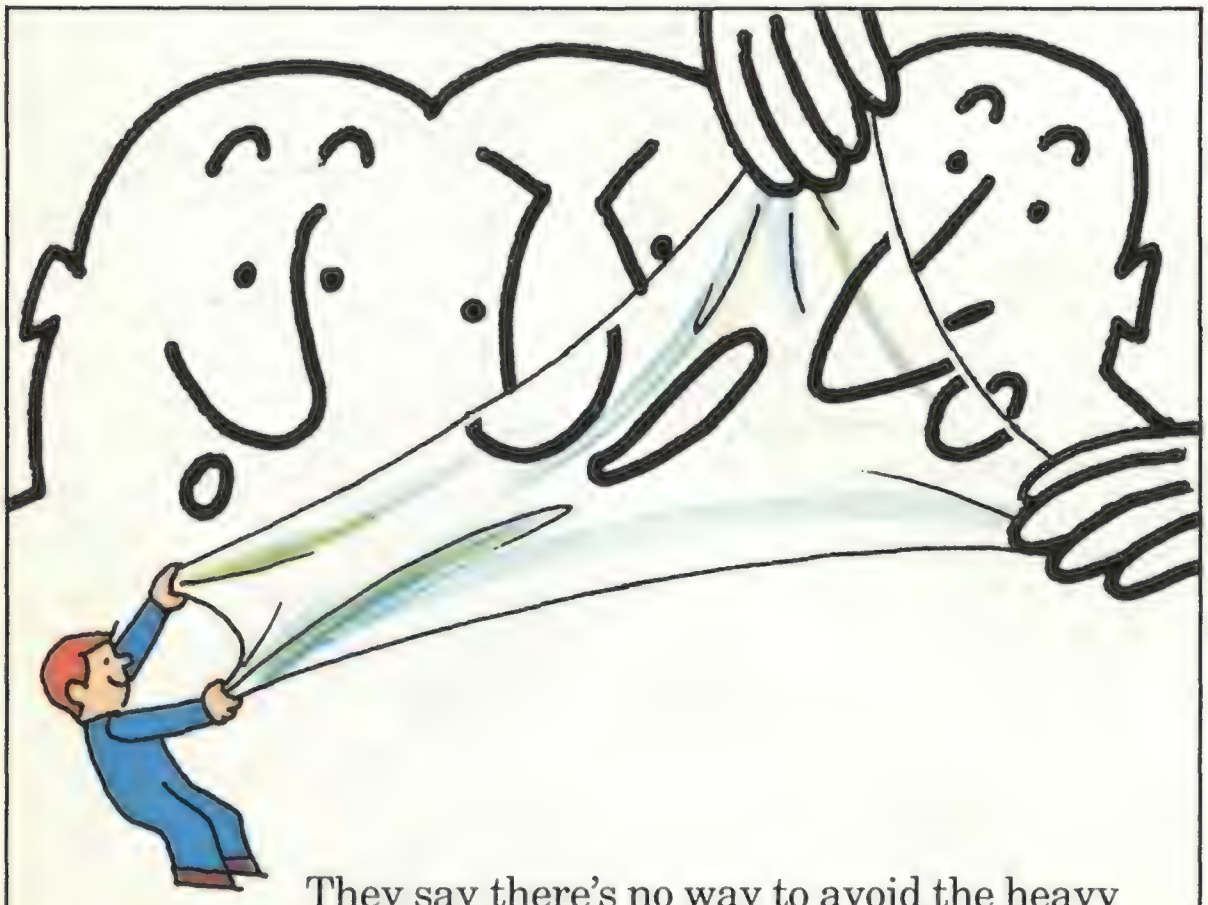

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—writing not previously included because of its later appearance in more polished form in *Walden, The Maine Woods, A Week on the Concord and Merrimack Rivers*—and essays on Carlyle and resistance. These years, the Walden ones (1845-47) in particular, were marked by a literary sowing and matched only by Thoreau's ambitious bean planting.

The "germ" theory—Sattelmeyer's apt term for Thoreau's method of sprinkling thoughts for later elaboration—is evident here. As Thoreau's distinctive voice matures it becomes less hectoring. As the moralism fades so does the uninspired poetry used to express it.

But most impressive and noticeable of all, despite Thoreau's deliberate cultivation of Carlyle's "extra-vagant" tone, is the increasing freshness and directness of his writing in these years. Whereas *A Week* is well distilled and distanced from the event to the writing, Thoreau looks back just one day—to his independent start at Walden on June 4, 1845—to begin his Walden 1 notebook (yes, even before B. F. Skinner there was a *Walden 2*, Thoreau's further notes for *Walden*): "Yesterday I came here to live. My house makes me think of some mountain houses. . . ."

With the sense of thoughts and works in formation that *Journal* provides ("a memorable intervale between the written and the spoken language," as Thoreau said of quite another matter), one yearns for more insights into the man Hawthorne called "wild, original—as ugly as sin." Where is Thoreau the whimsical inventor of raisin bread? Or Thoreau the indignant tax rebel after a night in jail? Or Thoreau the not-quite-independent independent drum heeder who left Emerson's home to build his own cabin, then left it to raid his mother's cookie jar?

Journal does provide glimpses into Thoreau's acerbic nature. "Thoreau is with difficulty sweet," Emerson said. At ease, Thoreau rates Wordsworth a "very feeble talent." And *Journal* in this form more than any other approaches Thoreau's own expectations for a Lyceum lecturer: "that he will read me a more or less simple & sincere account of his life."

While *Journal* may fail to capture the full flavor of the man, it does lend new insight into his remarkable creative processes. And it is evidence of what Scottish poet William Sharp (a.k.a. Fiona Macleod) wrote of Thoreau nearly a century

ago: "He must always be read, whether lovingly or interestedly, for he has all the variable charm, the strange saturninity, the contradictions, austerities and delightful surprises of Nature herself."
Don Lessem
Naturalist and critic for *Worcester Magazine*, Massachusetts

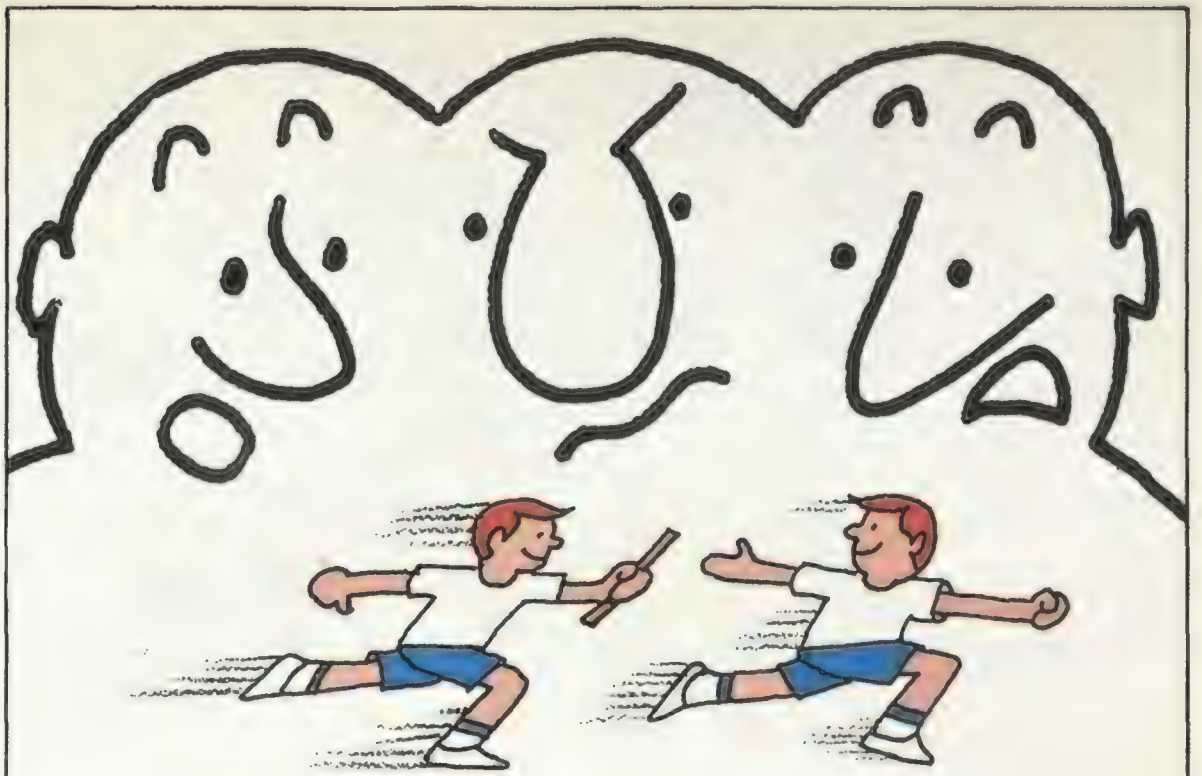
Pieces of White Shell: A Journey to Navajoland
Terry Tempest Williams
Scribners, $14.95

We are all collectors. Our pockets, purses, desks, closets, garages are littered with pieces of our past, cues for stories that blend into the personal mythologies of our lives. In *Pieces of White Shell*, Terry Tempest Williams coaxes such stories from a pouch of mementos on her desk at the Utah Museum of Natural History where she is Curator of Education. The items come from the natural world of the Navajo, a world in which she has journeyed, taught and—as this book gives ample witness—learned.

"I shake the objects out of their pouch," she writes. "What stories they tell: a sprig of sage; rocks, sand and seeds; turquoise, obsidian, coral; pieces of white shell; yucca; a bouquet of feathers bound by yarn; coyote fur; a bone from Black Mountain; deerskin; wool; a potshard and some corn pollen." Finally, to bring them all together, "Storyteller, a clay figurine from Jemez."

From the still life of these objects, Williams generates an animated composition that shuttles between the immanent mythological structures of the Navajo world and the scientific, analytical, fact-oriented perspectives of ours. Her style is engagingly direct, yet sensitive and poetic in its handling of what are, on both sides, matters of faith. Her key is the vital role of storytelling in all varieties of cultural consciousness and continuity.

Williams uses the desert, mountain and canyon landscape of Navajo country to establish both the ingenuous style and the narrative technique of the book. She went to Navajoland as a teacher. Introducing herself, she asked the class to take her on an imaginary walk in the desert. "Show me what you see. Let's make a list." She reproduces a random list of items that make up a Navajo child's environment—a list provided by her initially shy, then irrepressible Navajo children as she



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wrote on their reservation schoolroom blackboard: "ROCKS SAND SEEDS RATTLESNAKE HORNED TOAD BONES YUCCA FEATHERS." The list swelled to 81 items before she quit. Counting them, it should be noted, is a reflection of our own orientation and not that of the children who volunteered them—nor of the author, who lets their world accumulate for us by simply reproducing their list.

Next, Williams gives us a concise geologist's description of the Navajo landscape and 600 million years of its geomorphic development. The transition from this geological summary to the native material that follows is typical: "These rocks tell other stories as well," she notes, and leads us into a narrative cosmological account of this same spectacular landscape in the creation mythology of the Navajo.

In ensuing chapters, Williams weaves Navajo legends skillfully into the pattern of her own perceptions in the course of telling her own story. The structure of her book, framed within its prologue and epilogue in her museum office, allows her to interpolate segments of Navajo stories without violating the wholeness and continuity of the cultural view they articulate. Thus she avoids the sense of capricious wandering and tedium that often is the unfortunate effect of complex native mythologies spun out at length in alien language and context. Instead, the stories animate the inner logic of the book's sequential chapters as they proceed through totemic emblems of earth, water, air, plants, animals, death, survival, art, time and finally myth itself, embodied in the Storyteller.

Full-page illustrations by Navajo artist Clifford Brycelea add to the beauty of the book. The top of each drawing represents a prominent motif in the chapter it introduces, while a strip at the bottom reflects the symbolic spiritual meaning that Brycelea, as a Navajo, sees there.

At times, at moments, *Pieces of White Shell* moves us surprisingly close to its poetic center—symbolized in its title by white shells—"the currency between cultures." Yet, the author is sensible about her intentions and her limitations. "I am not suggesting we emulate . . . the Navajo," she explains. "We can't. We are not Navajo. Besides, their traditional stories don't work for us. . . . We must create and find our own stories, our own

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myths, with symbols that will bind us to the world as we see it today . . . in the midst of change." Her book is a welcome contribution toward the creation of those new stories.

Edward Lueders
Professor of English
University of Utah

Hackers: Heroes of the Computer Revolution
Steven Levy
Anchor, $17.95

The "hackers" Steven Levy portrays are not underendowed tennis players or writers but the quirky, obsessive mathematical whizzes who were the first to grasp and explore the wondrous possibilities of computers. They flocked to MIT's Artificial Intelligence Laboratory in the late 1950s and the 1960s and then to California, relentlessly curious kids Levy characterizes as "the last chosen in basketball and the first in arithmetic class to divine the mysteries of fractions."

Socially graceless, often inarticulate away from their terminals, these electronic frontiersmen were forever asking more of their machines—more magic, more intricacies, more power—and because their machines were computers they often got what they asked for. The home-computer industry was a by-product of their restless, imaginative "hacking."

The earliest computer hackers subscribed to an ethic that united them: access to computers (the Hands-On Imperative) should be unlimited, all information should be free, artificial considerations such as academic degrees and age (the youngest hackers were barely into their teens) were immaterial, institutional authority and bureaucracy were not to be trusted. Computers for them combined art, science and play, and were the finest outlet yet discovered for scientific creativity; there was also something *honorable* about computers—they were reliable and would never deceive you.

It was a heady time and a brave credo, and Levy's tale is packed with diverting anecdotes that illustrate the hacker's quest for perfection in a flawed world. One wizard punched the entire New York City subway system into his computer's memory (a ploy hailed as The Great Subway Hack)—and proved that a dogged voyager could travel to every station on every line with a single token. Another applied his

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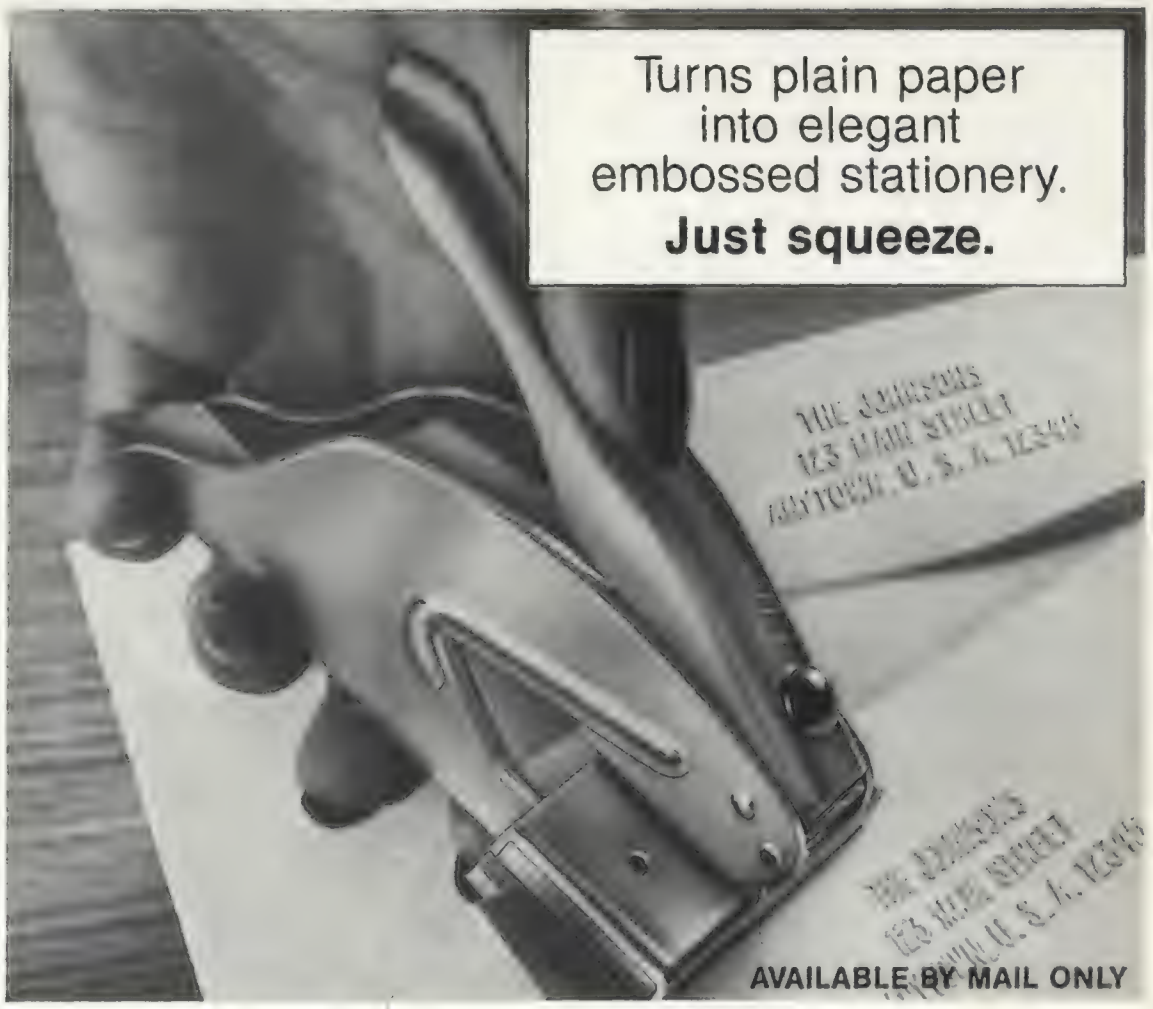

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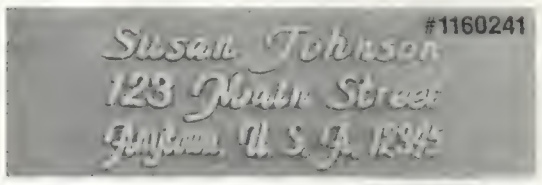

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hacker mentality to learning the symbols on the menu in a Chinese restaurant and adamantly insisted on ordering an improvised tongue-curdling dish called "sweet and sour bitter melon."

Shifting to the San Francisco Bay area and Silicon Valley in the 1970s, the hacking brotherhood appropriated elements of the mellow California style. An electronic bulletin board open to anyone, set up in a record shop in Berkeley, yielded this faceless plea: "Alien from another planet needs competent physicist to complete repairs on spacecraft. Those without knowledge of geomagnetic induction need not apply." My own favorite slice of California is the sign at an electronic junk shop in Oakland that read, "Price Varies as to Attitude of Purchaser."

Levy's narrative follows the hacker story from the dreamy, idealistic first generation at MIT through the Californians who refined the hardware, to the third generation of software programmers and tycoons in the 1970s and '80s. By then, inevitably, the hacker ethic had become a quaint notion from another age; the new name of the game was profit. The collective-spirit, free-information days were gone, and hacker-entrepreneurs now protected their valuable secrets. They had lawyers. "Everything is personal and good friends up to about ten thousand dollars," one young millionaire explained. In the breezy and somewhat breathless style that he employs throughout, Levy identifies the current phase of the hacker evolution as "Croesus mode." Inspired play has been transformed into commercial competition, and the hacking of yesteryear is in nostalgia mode.

Levy's account goes on for perhaps 100 pages more than it needs to, and his heroes never quite emerge as fully rounded, three-dimensional characters. But the charm of his book is its high-spirited evocation of the brilliant, irreverent, sometimes deranged but always recognizably human figures behind the computer revolution, the fuzzy-faced geniuses who puzzled out how these wonders worked and what they could do. The hackers he salutes are members of the same species that has tinkered with, explored and refined every new technological idea from the printing press to space vehicles. It's comforting to know they're still around.

Donald Dale Jackson
Author of the forthcoming book,
Twenty Million Yankees

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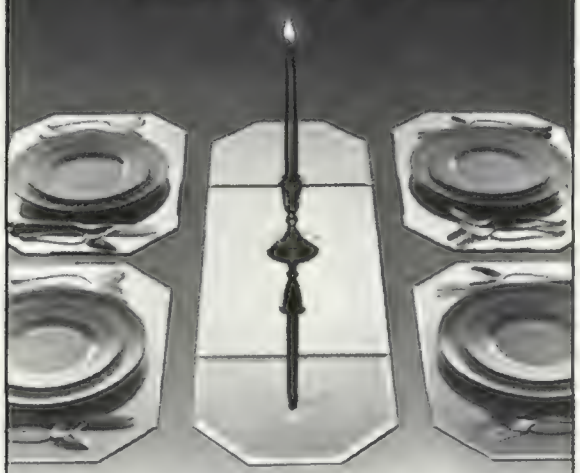

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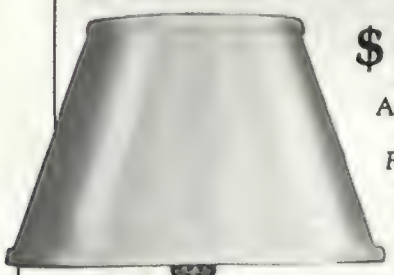

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Additional reading

Smithsonian horizons (p. 14)

"Primitivism" in 20th Century Art: Affinity of the Tribal and the Modern (2 vols.), edited by William Rubin, Museum of Modern Art, 1984

Anthropology and Art: Readings in Cross-Cultural Aesthetics, edited by Charlotte M. Otten, Natural History Press (New York), 1971

Auto junkyards (p. 52)

The American Car Since 1775, senior editor Beverly Rae Kimes, Dutton, 1971

Automobile and Culture by Gerald Silk, Angelo Tito Anselmi, Strother MacMinn and Henry Flood Robert jr., Abrams, 1984

"Bumper Crop: Six Top Auto Graveyards" by Rinker Buck, *New York,* April 23, 1979

Animal consciousness (p. 66)

Animal Thinking by Donald R. Griffin, Harvard University Press, 1984

Ethology, The Mechanisms and Evolution of Behavior by James L. Gould, Norton, 1982

The Evolution of Primate Behavior by Alison Jolly, Macmillan, 1984

Richard III (p. 82)

Good King Richard? by Jeremy Potter, Constable (London), 1983

Richard III by Charles Ross, University of California Press, 1981

Richard the Third by Paul Murray Kendall, Morton, 1956

The Crown and The Tower, researched and edited by William H. Snyder, Richard III Society Inc. (P.O. Box 217, Sea Cliff, NY 11579), 1981

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George Stubbs (p. 110)

George Stubbs 1724-1806 (exhibition catalog), Tate Gallery Publications (London), 1984

Stubbs by Basil Taylor, Harper & Row, 1971

Mr. Stubbs the Horse Painter by Constance-Anne Parker, J. A. Allen (London), 1971

Mangroves (p. 122)

The Ecology of the Mangroves of South Florida: A Community Profile by William E. Odum, Carole C. McIvor and Thomas J. Smith III, U.S. Fish and Wildlife Service, January 1982

"Global Status of Mangrove Ecosystems," compiled by the International Union for the Conservation of Nature and Natural Resources, *The Environmentalist*, Vol. 3, Supplement 3, 1983

"A General Account of the Fauna and Flora of Mangrove Swamps and Forests in the Indo-West-Pacific Region" by William Macnae, *Advances in Marine Biology*, Vol. 6, 1968

Colombian art (p. 138)

Town in the Empire: Government, Politics, and Society in Seventeenth-Century Popayán by Peter Marzahl, University of Texas Press, 1978

The Forgotten Ones: Colombian Countrymen in an Urban Setting by Michael B. Whiteford, University of Florida, 1976

Brandywine Valley (p. 150)

Protecting Historic Properties: A Guide to Research and Preservation by Martha L. Wolf, Brandywine Conservancy, 1984

The Brandywine by Henry Seidel Canby, Schiffer Limited (Exton, Pennsylvania), 1941

Smokejumper (p. 167)

Fire in America: A Cultural History of Wildland and Rural Fire by Stephen J. Pyne, Princeton University Press, 1982

A Pictorial History of Smokejumping by Stan Cohen, Pictorial Histories Publishing (Missoula, Montana), 1983

Standardization (p. 176)

Measures for Progress: A History of the National Bureau of Standards by Rexmond C. Cochrane, U.S. Department of Commerce, 1966

The World of Measurement by H. Arthur Klein, Simon and Schuster, 1974

Smithsonian highlights

A number of new exhibitions have opened recently, and two of the most delightful are *The Four Continents* at the Cooper-Hewitt and *Zoo to Art: Animal Subjects by American Sculptors* at the National Museum of American Art. *The Four Continents* brings together more than 100 objects in porcelain, pottery, metalwork and a variety of other media that depict the giant landmasses, often through fanciful imagery (p. 206). *Zoo to Art* includes 50 works—from naturalistic studies to comic portrayals—of cats (p. 207), owls, bears and other denizens of the animal kingdom.

Special March exhibits and events

National Air and Space Museum
Space Fiction Film Series (March 1, 8, 15, 16; 7:30 P.M.; Langley Theater) Classics include *Mutiny in Outer Space* and *Green Slime.*
Pulling Out of Winter (March 2; 10 A.M.) Monthly sky lecture.
Venus: Earth's Wayward Twin (March 20; 7:30 P.M.) Lecture by Thomas Donahue.

Cooper-Hewitt Museum (New York)
Old Master Prints from the Wallerstein Collection (March 5-May 26).
The Four Continents (through May 19) Fanciful images in a variety of media.
Chinese Gold and Silver from the T'ang Dynasty (through April 21).
Cut Paper (through May 12).

National Portrait Gallery
The Sage of Emporia (March 8, 9; 7:30 P.M.) Jack Wright portrays William Allen White, editor of the *Emporia* (Kansas) *Gazette.* For tickets, call 357-3030.

National Museum of American Art
Creation and Renewal: Views of Cotopaxi by Frederic Edwin Church (March 29 through July 14).
Zoo to Art: Animal Subjects by American Sculptors (March 1 through October 14).

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National Museum of Natural History
Seventy-Five Years of the National Museum of Natural History (March 15-May 26) Photographs and architectural renderings.
The 'New' National Museum: Yesterday and Today (March 15; noon) Lecture by Ellis L. Yochelson.

Resident Associate events

To become a Resident Associate, or to find out about the many other activities presented monthly, or for fee and ticket information, call 357-3030. Here are some March events:
Spoon River Anthology (March 3; 7:30 P.M.) Tammy Grimes and Fritz Weaver read selections to piano accompaniment by Edward Mattos.
Red Rodney and Ira Sullivan In Concert (March 10; 7:30 P.M.) Jazz concert.
Natural History in the Marketplace (March 11; 8 P.M.) Lecture by Douglas Bassett, National Museum of Wales.
Tuesday Mornings at the Smithsonian (March 12, 19, 26; 10 A.M.) Krakatau,

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Victorian Splendors at Kew: Buildings and Gardens (March 13; 6 P.M.) Lecture by Charmian Lacey, superintending architect for British Crown properties.

Smithsonian Chamber Orchestra Plays Mozart! (March 15, 16; 8 P.M.) With guest conductor Jaap Schroeder.

Liz Lerman and the Dance Exchange (March 22; 8 P.M.) Program includes Dancers of the Third Age.

Smithson String Quartet (March 26, 27; 8 P.M.) Quartets.

Theatre Plexus (March 26-April 20) Performing group unites dance, mime and vaudeville for young audiences in Discovery Theater. See *Highlights continued.*

Deaf Dimensions (March 31; 2:30 P.M.) Performers combine dance and American sign language.

Smithsonian on the air

Radio Smithsonian: features on this weekly half-hour program include the art and life of Jim Dine, research showing how animals use tools, and the story of a hair-raising expedition to a remote Venezuelan mountain.

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The 13th Musical Weekend, April 26-28, will open with the traditional bagpipe salute and dinner in the historic Smithsonian castle. Participants will hear Pinchas Zukerman performing with the National Symphony Orchestra at the Kennedy Center for the Performing Arts. A reception will follow. Saturday, a demonstration of the outstanding instruments in the collection of the Division of Musical Instruments will be followed by a Potomac boat ride and picnic on the restored sternwheeler *First Lady*. Tea and music at the British Embassy, dinner in the Flight and the Arts Gallery at the National Air and Space Museum and a gala concert by the Smithsonian Chamber Players are among the events planned. A champagne breakfast at the Zoo will take place Sunday morning. For reservations write Musical Weekend, Room 4124 NMAH, Smithsonian Institution, Washington, D.C. 20560.

National Associates Lecture and Seminar Program

In March, the Lecture and Seminar Program will travel to Phoenix and Las Vegas to present activities designed to acquaint Associates living outside Washington, D.C., with current Smithsonian research. The events in Phoenix, March 19-25, fea-

ture lectures on Amazon ecology and American costume, and seminars on Impressionist art and Southwestern archaeology. Highlights of the Las Vegas series, March 20-24, include lectures on plate tectonics, and seminars on aviation history and scientific illustration.

Host cities scheduled for early April include Omaha (April 9-15) and Lincoln (April 11-16), Nebraska, and Savannah (April 9-14), Georgia. Events in these cities will include lectures and seminars on American landscape art, portraiture and contemporary crafts, historic preservation, and milestones of aviation history. Associates living in these cities should have received invitations by this time. For further information, write: Lecture and Seminar Program, A&I 1190, Smithsonian Institution, Washington, D.C. 20560.

Smithsonian Institution Traveling Exhibition Service

SITES circulates exhibitions to hundreds of cities outside Washington. To sponsor a show in your community, write: SITES, Smithsonian Institution, Washington, D.C. 20560. Here are some of the March exhibits:

Los Angeles (March 1-May 31) *Ban Chiang: Discovery of a Lost Bronze Age*, Los Angeles County Museum of Natural History.

Chicago (March 9-June 16) *The Art of Cameroon*, Field Museum of Natural History.

Worcester, Massachusetts (March 2-31) *The Long Road Up the Hill: Blacks in Congress, 1870-1983*, Gordon Library, Worcester Polytech Institute.

Houston (March 30-May 26) *Newcomb Pottery: An Enterprise for Southern Women, 1895-1940*, Museum of Fine Arts.

Membership benefits when visiting the Smithsonian

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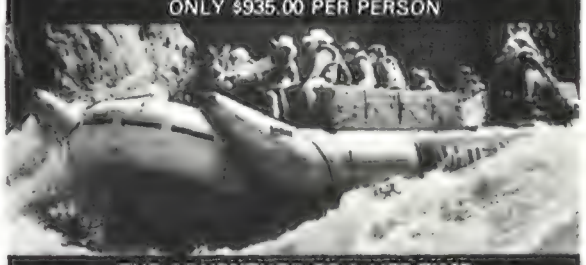

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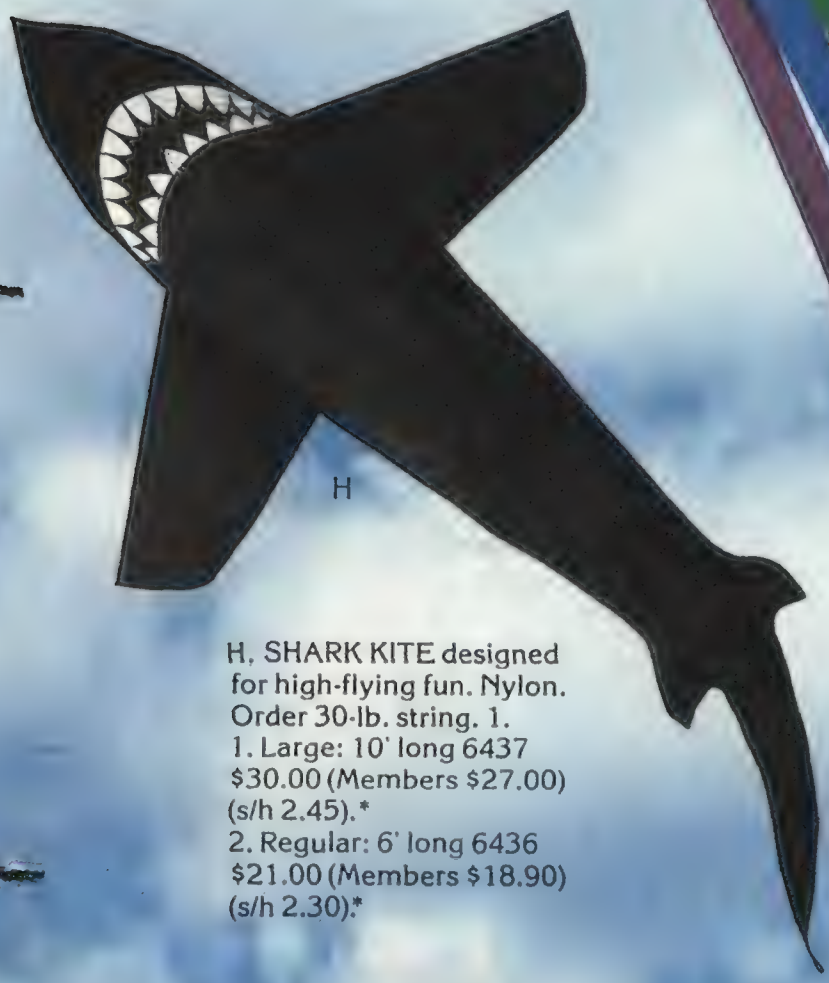

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Onstage with Discovery Theater

Combining mime, dance, juggling and the slapstick of vaudeville, Plexus keeps the children laughing

Since 1977, the Smithsonian Institution's Discovery Theater—which serves young audiences from October to June—has had a steadily growing attendance. Last year, 50,000 children from 350 schools were bused to the Mall to see professional groups presenting mime, dance, puppetry, storytelling and original plays. In recent months, they have been treated to an introduction to jazz (featuring a trio led by Keter Betts, Ella Fitzgerald's bass player), and a staging of *Puss in Boots* by the Bob Brown Puppet Company. Later on this spring, masked performers and puppets will relate Rudyard Kipling's *Just So Stories.*

From March 26 to April 20, youngsters from third grade through junior high will see Theatre Plexus. Formed in 1979, this three-person group combines masks, dance, mime, vaudeville and the circus into a series of short pieces. Some of them are thought-provoking: in "Only One Chair," for example, a poor soul (played by Joe Mori) successfully fights off some aggressive folks who want to steal his chair—only to have the stage go dark when he finally sits down and starts to read his newspaper.

Theatre Plexus' wackiest routine is Kurlytov Cirkus. The premise is that this family group has just arrived from Siberia to perform; but once they have begun, the suitcase containing all their props refuses to open. They must ad lib, using what they can scrounge up on the stage. Speaking in Russian gibberish, Cordova Kurlytov (Robert Morse) introduces Natasha (Jyl Hewston). "Salami!" he proclaims with a flourish (garbling the name Salome) as she frantically pulls scarves from her costume and begins to juggle them. The skit is filled with such slapstick, as well as expert juggling and acrobatics—and the kids love it.

To find out more about Theatre Plexus, or the future offerings in Discovery Theater (which is under the aegis of the Resident Associate Program), call 357-1500 or, for hearing impaired, 357-1696.
Constance Bond

Juggling scarves, Natasha Kurlytov (Jyl Hewston) does her Salome routine.

A frazzled Cordova Kurlytov (Robert Morse) struggles with jammed suitcase

The three members of Plexus group pose in roles as Russian circus family.

Long-faced Joe Mori plays Sad Sack character.

Wearing mask of a steer, Joe Mori faces audience in vignette called "Beasts."

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Chesapeake Bay Cruise May 18-25: Enjoy fresh crabs and oysters aboard the elegant yacht *Nantucket Clipper*, while learning about the bay's history. Cruise to such charming 18th-century towns as Annapolis, St. Michaels and Williamsburg.

Chicago June 12-16: Walking tours and special programs to study the city's stunning architectural legacies and cultural wealth.

Alaska June 15-25: Board the *Majestic Alaska Explorer* for a breathtaking cruise from Seattle to Ketchikan through Alaska's famed Inside Passage.

Grand Canyon July 5-15: Raft with expert boatmen through magnificent landscape. Camp beside the river, see Indian petroglyphs, learn about wildlife, history.

Vermont Sampler July 12-20: The peaceful beauty of Vermont in summer sets the stage for a look at its history, culture and crafts.

Waterton-Glacier International Peace Park July 16-27 or August 13-24: Hike through spectacular alpine scenery with naturalists. Spend nights in remote, picturesque lodges and chalets.

Oregon July 19-28: Fresh sea air, colorful wild flowers, mountain vistas and historic lodges highlight this outdoor adventure.

Journey on the Green River July 19-29: Experience the thrill of white water and the beauty of Utah's magnificent Desolation and Gray Canyons.

Natural History in the Colorado Rockies July 28-August 3: Hike the majestic Pikes Peak area to examine local flora, fauna and unique geological formations.

Middle Fork August 5-13: An unforgettable river trip on Idaho's Salmon River. Camp under the stars, see nature at its best.

Colorado Mining and Railroads August 9-17: Relive the days when steam locomotion opened the West and the gold rush brought Telluride, Durango and Ouray to life.

Crow Canyon Archaeology August 11-18: Get hands-on experience as you join archaeologists near Mesa Verde, Colorado, to participate in a dig at an ancient Indian site.

Delta Queen September 6-14: STEAMBOAT A-COMIN! Board the legendary paddle-wheel steamboat for a nostalgic voyage on the mighty Mississippi to Hannibal, Missouri, for the grand celebration of Mark Twain's 150th birthday.

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Canals and Old Masters April 10-24: Art museums, historic tours and spring flowers highlight four days in Amsterdam. Then sail by riverboat to explore medieval ports.

Paris and Provinces April 20-May 5: Springtime in Paris! Six days with walking tours and special seminars at the Louvre, followed by your choice of travel to Provence or Burgundy to see the countryside.

Ecuador and the Galápagos Islands May 11-24: After visiting Quito and the Andean countryside, board the *Santa Cruz* for a study voyage to Darwin's famed islands.

Russia May 12-28: Leningrad, Moscow and Tallinn. See the Hermitage, Kremlin and other fabulous museums, palaces and landmarks. Visit schools, factories, clinics and enjoy the best of Russian theater.

Irish Walk May 14-25 or September 18-29: Tour scenic villages, hike leisurely trails through serene country settings, stay overnight at castles and charming hotels.

Danube Cruise May 23-June 9: Explore magnificent castles, cathedrals and palaces on this historic route from Bucharest to Vienna via chartered ship.

Wild Highlands of Scotland May 30-June 17: Based in a castle, travel to scenic offshore islands, walk through moors and glens surrounded by gentle Scottish hills and green forests, meet with local people.

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Land of the Vikings July 21-August 4: Spend three days exploring historic Edinburgh, then embark for Norway's majestic fjords and Copenhagen on the *Illiria*.

Iberia and Provence August 12-26: Visit Santiago de Compostela and Carcassonne during a cruise on the elegant *Argonaut* in Portugal, Spain and France.

Setting the Stage for Shakespeare June 6-19 or 13-26: Savor the atmosphere of Chaucer and Malory. Visit towns, cathedrals and castles that set the stage for their literary works.

Trans-Siberia September 3-26: Cross Siberia on Train No. 1, the Russia Express. Depart for Outer Mongolia, Central Asia or Moscow and Leningrad.

Oxford Seminar September 13-28: Study with Oxford faculty, live in an academic setting, see historic English villages.

Write National Associates, Capital Gallery 455, Smithsonian Institution, Washington, DC 20560 or call (202) 287-3362 for tour brochures

in Washington

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Animal Communication: Classic Studies and New Discoveries
March 24-29, 1985
Michael Robinson, Director of the Smithsonian's National Zoo, and other eminent animal behaviorists offer special sessions at the Zoo and all-day field trips to its Conservation and Research Center in Front Royal, Virginia, and the National Aquarium in Baltimore.

American Masterpieces: Three Centuries of Antique Furniture
March 24-29, 1985
Oscar P. Fitzgerald, author of the acclaimed *Three Centuries of American Antique Furniture*, and William Stahl of Sotheby's explore a range of historical styles and provide insight on current market trends. Includes tours of the Diplomatic Reception Rooms at the State Department and Winterthur Museum.

Aircraft Restoration Workshops with Smithsonian Craftsmen
May 19-23, 1985
The master artisans of the National Air and Space Museum share their specialized techniques at its Paul E. Garber Facility.

Fine Ceramics of the Ming and Qing Dynasties
June 2-7, 1985
Experts lecture and conduct special tours at the Smithsonian's Freer Gallery and the National Gallery of Art. Seminar will cover spectacular porcelains of this period of more than five centuries.

Smithsonian Seminars in Washington are intended to provide enjoyable educational opportunities that further your involvement with the Smithsonian. All programs include classes and tours, welcoming reception, discussions with fellow Associates and a gala farewell luncheon. Hotel is optional.

or (202) 357-1350 for seminar brochures.

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By Raymond E. Lovett

Some family portraits, farfetched but fond

Today I got the following:

"Dear Friend,

"The Lovett name is very rare and our research has shown that less than six one-thousandths of one percent of the people in America share the Lovett name. *The Complete Registry of the Lovetts in America* is ready for printing and *you are in it*! This only book of its kind in the entire world comes with such topics as:

"How the Lovett family got its name and what Lovett means.

"Important but little-known facts about all the Lovetts in the United States.

"Where we discovered an unusual Coat of Arms granted 600 years ago to an early Lovett together with an expert interpretation of its meaning."

The letter comes with a picture of the author, a plump woman from Ohio, reading her own "fascinating book." The book can be mine for only $26.83—if ordered within the next two weeks.

This shameless appeal to family pride made me waver for a moment in my long-standing resolution never to fall for unsolicited glitter. But then I realized how barren the world would be if all the family stories about my paternal ancestors were to be reshaped by fact, number, blood or even, heaven forfend, the truth itself. No! No! and No! Not for me. What's a life without an outrageous story to warm it up a bit?

Thick Jack, for example, would be listed as a potato farmer who never amounted to much, rather than the man who walked from Manchester, Vermont, to Danby, Vermont, to cover up his neediness. Newly arrived in America from Ireland, he boarded the train for a job in a quarry in Danby. Unable to read, he counted the 12 stops to his destination. As the train approached the 12th stop he decided to check his whereabouts with three men seated across from him. A self-conscious stranger, he asked in a heavy brogue, "Would ye be kind enough, lads, to tell me if Danby is next?"

"Not by a long shot, Mick, unless you want to walk 13 miles," answered one man. The other men laughed.

"It's the stop after next," said the man.

Angered now, Thick Jack thought they were poking fun at him.

"You're wrong. This is the place. I know it well," he lied as he exited at Manchester. He walked the 13 miles without stopping. To this day, asking directions—and following directions—are avoided by males in our family.

Silent Con was a great-great-uncle who seldom spoke and never amounted to much. He fathered 13 children and generally communicated with them by telling looks and bows of the head. He was known as "the man with a tongue in his eyes." He had a marvelous silent control over his children's behavior, his power being attributed to magic. He was a blacksmith who could, it was said, pound out a wide range of melodies in perfect rhythm and tone. A fierce two-part competition arose among mourners at his wake centering on who had heard his longest utterance and who had listened to his longest anviled melody. "That horse is dead, I think" won first place for words, and "The Rising of the Moon" for melody.

Cousin Brendan never amounted to much, though he is still alive, just barely, at age 94. As mayor of a small town in Vermont he refused to say hello or goodbye on the telephone. He would begin to talk immediately, state his business with Cal Coolidge sparsity, and always hang up without a good-bye."Have a good day" would have made Cousin Brendan vomit.

So helplessly in love with travel and adventure that he never took a job, Uncle Ed is known as the family romantic. He never amounted to much either. He had a deep faith in God and wrote reams of poetry that he could recite from memory with dramatic flair. "Ed lives in the hands of God," the family kept saying and nearly came to believe it. We knew he was a drunk. We loved him drunk. He died a young man while hitchhiking across the country—hit by a bus, no less. It is now being said he was the smartest man in the state of Vermont in 1953, with the best memory in the whole country during that one year.

Myth is far more soothing than fact. Facts might show that the new family men are lowering the age of marriage—from 36, the previously mandatory minimum. We Lovett men have been loyal to our mothers, staying with them beyond the call of normal valor and years.

Shy Rory Lovett, a cousin twice removed, was voted the most bashful man in his town. He never married or dated, and never amounted to much. He kept his eyes away from folks. He was fearful of social contact, they said. When his neighbor's barn was hit by lightning and caught fire, he ran to another neighbor's house with the news so as not to offend the man being burned out.

"He never amounted to much" has become a family phrase associated with the family myth, a requisite for admission into the club of Lovett immortality. The less you amounted to, the greater the myth. The challenge is to take a family skeleton and dress it with life-giving warmth and weakness.

No, lady, no book for me about the Lovetts of America. I will not trade my stories for any wealth of facts, careers or statistics, no matter how ego-enhancing. One of my future grandchildren might see my name in your book and think I amounted to something.

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